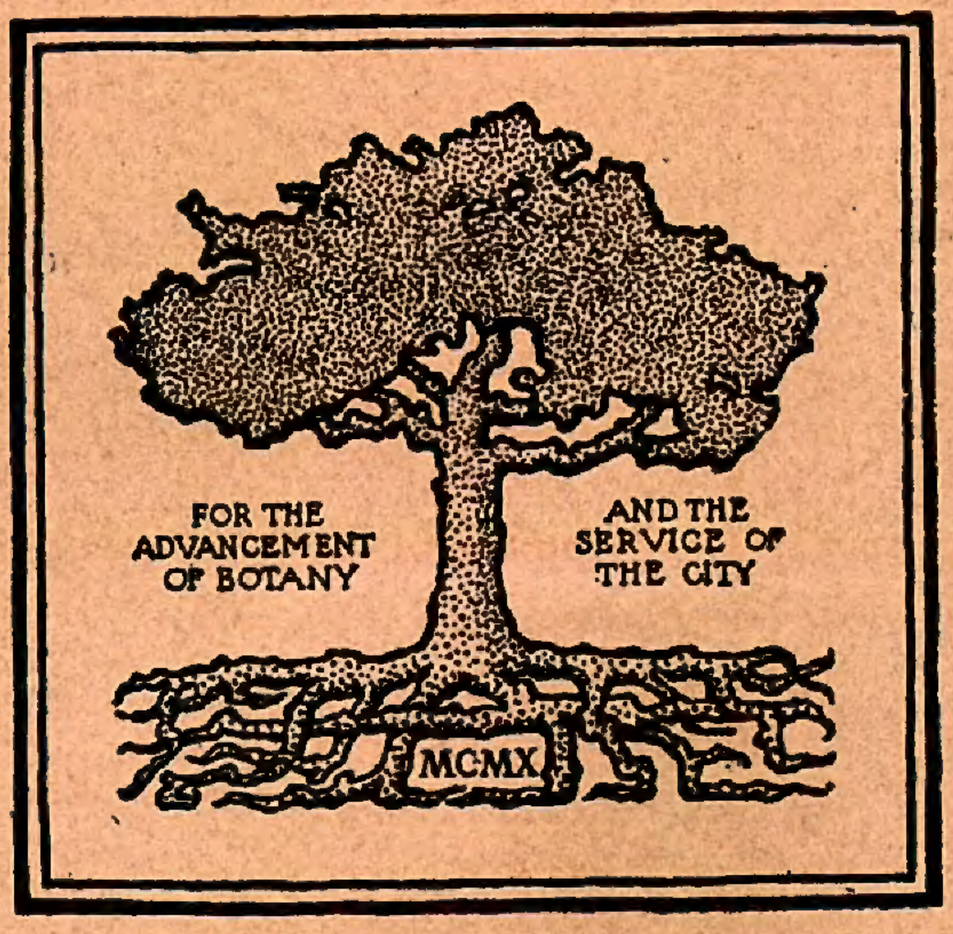
BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIX JANUARY, 1940 NO. 1



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PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

BROOKLYN BOTANIC GARDEN

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[1] Resigned as of December 31, 1939.
[2] Beginning January 1, 1940.

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BROOKLYN
BOTANIC GARDEN
RECORD

VOL. XXIX JANUARY, 1940 NO. 1

DELECTUS SEMINUM, BROOKLYN 1939

List of Seeds Offered in Exchange

These seeds, collected during 1939, are offered to botanic gardens and to other regular correspondents; also, in limited quantities, to members of the Brooklyn Botanic Garden. They are not offered for sale.

Please note that applications for seeds must be received during January or February. Seeds are mailed early in March. No seeds are available at other times of the year.

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plumosa superba (yellow)
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barbatus L.
deltoides L.
lannosus var. magnificus
sylvestris Wulf. var. pygmaeus

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chalcedonica L.
Flos-cuculi L.
Coronaria Desr.

Saponaria
caespitosa DC.
ocymoides L.

Silene
alpestris Jacq.
Armeria L.
conica L.
japonica Rohrb.
latifolia Britt. & Rendle
pennsylvanica Michx.
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tatarica Pers.
Zawadskii Herb.

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pratensis Sole
sylvestris Sole

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punctata L.
Russelliana Nutt.
stricta Wooton

Nepeta
camphorata Boiss. & Heldr.
Mussini Spreng.

Ocimum
Basilicum L.
canum Sims

Origanum
vulgare L.
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Perilla
frutescens Britt. var. nankinensis Bai.

Phlomis
alpina Pall.
tuberosa L.

Prunella
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grandiflora var. rosea
vulgaris L. var. laciniata

Salvia
farinacea Benth.
Jurisicii Kosan
pratensis L.
pratensis var. alba
splendens Ker-Gawl
sylvestris L.
verticillata L.

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Acinos Scheele

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tinctoria L.

Arctotis
stoechadifolia Berg.

Artemisia
sacrorum Ledeb.

Aster
alpinus L. var. ruber
Amellus L. var. elegans
cordifolius L.
ericoides L.
Farreri Hort.
linariifolius L.
puniceus L.

Boltonia
latisquama A. Gray

Cacalia
suaveolens L.

Centaurea
macrocephala Puschk.

Cirsium
tuberosum (L.) All.

Coreopsis
Drummondii T. & G.

Dysodia
aurea A. Nels.

Emilia
flammea Cass.

Erigeron
corymbosus Nutt.
Howellii A. Gray
pulchellus DC.

Eupatorium
coelestinum L.
urticaefolium Reich.

Gaillardia
aristata Pursh

Helenium
Hoopesii A. Gray

Helianthus
orgyalis DC.

Inula
grandiflora Willd.
salicina L.

Liatris
scariosa Willd.

Matricaria
inodora L.

Rudbeckia
laciniata L.
speciosa Wend.

Senecio
aureus L.
Biebersteinii Grec.
Clivorum Maxim.
macrophyllus Bieb.
orientalis Willd.

Solidago
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Sisyrinchium
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SEEDS FROM NATIVE PLANTS

Actaea alba (L.) Mill.
Aralia nudicaulis L.
Amelanchier oligocarpa (Michx.) Roem.
Caulophyllum thalictroides Michx.
Chimaphila umbellata (L.) Nutt.
Clintonia borealis (Ait.) Raf.
Coptis trifolia (L.) Salisb.
Cornus canadensis L.
Cornus paniculata L'Hér.
Cypripedium acaule Ait.
Hamamelis virginiana L.
Ilex verticillata (L.) Gray
Leavenworthia
stylosa A. Gray
torulosa A. Gray
Lilium tigrinum Ker.
Lobelia inflata L.
Lyonia ligustrina (L.) DC.
Maianthemum canadense Desf.

Medeola virginiana L.
Nemopanthus mucronata (L.) Trel.
Pyrus americana (Marsh) DC.
Rosa carolina L.
Sambucus canadensis L.
Smilacina racemosa (L.) Desf.
Spiraea latifolia Borkh.
Taxus canadensis Marsh.
Thalictrum polygamum Muhl.
Trientalis americana (Pers.) Pursh
Trillium undulatum Willd.
Viburnum acerifolium L.
Viburnum alnifolium Marsh.
Viburnum Opulus L. var. americanum (Mill.) Ait.

Address requests for seeds to reach us **before March 1, 1940** to

SEED EXCHANGE,
Brooklyn Botanic Garden,
1000 Washington Avenue,
Brooklyn, N. Y., U. S. A.

SOME INTERESTING WOODY PLANTS IN THE BROOKLYN BOTANIC GARDEN

The following plants are noteworthy because of their scarcity in cultivation or their ability to survive in this climate. In most cases they are growing in protected situations and many of them are given a light covering of burlap over winter. The majority of the plants are on their limit of hardiness and it is doubtful whether they could survive farther north.

Broad-leaved Evergreens

Bupleurum fruticosum (Umbelliferae). A sparsely-branched shrub with gray-green leaves and glaucous branches. Of special interest in that it is the only woody member of the Parsley Family that will grow this far north. Plants four years old average three to four feet in height.

Elaeagnus pungens (Elaeagnaceae). A shrub from Japan with handsome foliage that is dull white on the undersurface. The abundant white flowers are produced in October and November and are delightfully fragrant. Plant about twenty years old, seven feet high.

Ilex dipyrena (Aquifoliaceae). An Himalayan Holly of compact habit, with spiny, glossy leaves about two inches long and with short-stemmed, grooved fruit. About four feet high, planted 1933.

Ilex Fargesii. The specimen in the Botanic Garden is about twenty years old and four feet high. Remarkable because of its long, narrow leaves which are suggestive of Oleander.

Ilex pedunculosa. A distinct and interesting species from Japan where it is said to attain twenty or thirty feet in height. The oval leaves are unusual in being entire—completely devoid of spiny teeth. The red berries are borne on slender, nodding stems often one and three-quarters inches long. Planted in 1932, it is now about six feet high, thin and open in habit and evidently perfectly hardy.

Kadsura japonica (Magnoliaceae). A climbing shrub in the Magnolia Family with attractive glossy foliage and small, inconspicuous creamy-white flowers. Planted 1925 south of a wooden fence.

Laurus nobilis (Lauraceae). Laurel, Sweet Bay. The laurel used by the ancients in crowning their heroes. In the Mediterranean region it forms a large tree, but in Brooklyn it is a shrub five feet tall. The fragrant foliage and rank growth are usually injured during the winter but the roots seem hardy.

Magnolia grandiflora (Magnoliaceae). Bull Bay. Small tree with beautiful large leaves. Winter injury is frequent and the fragrant white flowers are only rarely produced. The several plants here vary in height from six to nine feet.

Osmarea Burkwoodii (Oleaceae). A slow-growing shrub with toothed, ovate leaves about one and one-half inches long. It is supposedly a hybrid of Osmanthus and Phillyrea. Planted 1934, now about 2 feet high.

Photinia serrulata (Rosaceae). A Chinese shrub with handsome large leaves that are red or coppery when developing; the current year's growth remains red all season. Plants five years old are now five feet tall and come through the winter in a protected place almost unharmed.

Quercus myrsinaefolia (Fagaceae). In its native habitat, Japan, this oak forms a large tree, but with us it is a shrub four or five

feet tall. The leaves are from two to four inches long and are not particularly oak-like. There has been no injury in the past two winters.

Viburnum utile (Caprifoliaceae). A shrub with slender stems and small, glossy leaves, interesting as being one of the few evergreen Viburnums that will come through our winters. Planted 1925, now about three feet.

Deciduous Plants

Alangium platanifolium (Alangiaceae). An odd, slow-growing shrub with broad, lobed leaves and inconspicuous white flowers. Planted 1933, now about 4 feet high and seems to be hardy.

Dipteronia sinensis (Aceraceae). A small tree from central China with ornamental pinnate leaves. It is of particular interest in belonging to the only other genus besides *Acer* in the Maple Family. Planted 1933, now about 6 feet tall; for the past 4 years it has been growing without protection, and winter injury has been negligible.

Firmiana simplex (Sterculiaceae). Chinese Parasol Tree. A tree from the warmer parts of China and Japan that has been growing outdoors in the Botanic Garden for over 20 years. The bark of the branches and trunk, even to the base, is green and smooth and the palmately-lobed leaves are often over one foot long. Now about 18 feet tall.

Jasminum Beesianum (Oleaceae). A slender shrub with green stems; it differs from the other Jasmines in having red flowers and simple leaves.

Picrasma quassioides (Simarubaceae). A small Asiatic tree with slender trunk and branches, closely related to Ailanthus. It has no particular ornamental value, but is interesting because of its scarcity in cultivation. Now about 18 feet high; seems perfectly hardy.

Pistacia chinensis (Anacardiaceae). The Chinese Pistachio with us forms a bush about 6 feet high with ornamental pinnate leaves. It is used as grafting stock for the pistachio-nut tree (*P. vera*) of commerce. Planted 1934.

Platanus orientalis (Platanaceae). Oriental Plane. This tree is rarely seen in America and the specimen in the Botanic Garden, about 40 ft. tall, is perhaps one of the largest in this region. The tree generally sold by nurserymen under this name is London Plane, *P. acerifolia,* a hybrid form.

Sapium sebiferum (Euphorbiaceae). Chinese Tallow Tree. An interesting small tree with attractive foliage. It has flowered here but has not set fruit. In China the waxy covering of the berries is used in making candles and soap. Planted 1934, now about 8 feet high.

Vitex trifoliata var. *unifoliolata* (Verbenaceae). A low, sprawling shrub with simple leaves and blue flowers. Though found in southern Asia and Polynesia it has come through several winters here with little or no protection.

Charles F. Doney

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Contributing Membership, $100 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Free to members of the Garden. To others $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Papers:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 papers on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 85. Monographic studies in the Genus Eleocharis. V. 110 pages. 1939.

No. 86. The emergence of smut-inoculated oat seedlings through sand and loam soil. 7 pages. 1938.

No. 87. Flower buds and phylogeny of Dicotyledons. 9 pages. 1939.

No. 88. The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 37. The Cyperaceae. 7 pages. 1939.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. Price, 50 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIX APRIL, 1940 NO. 2

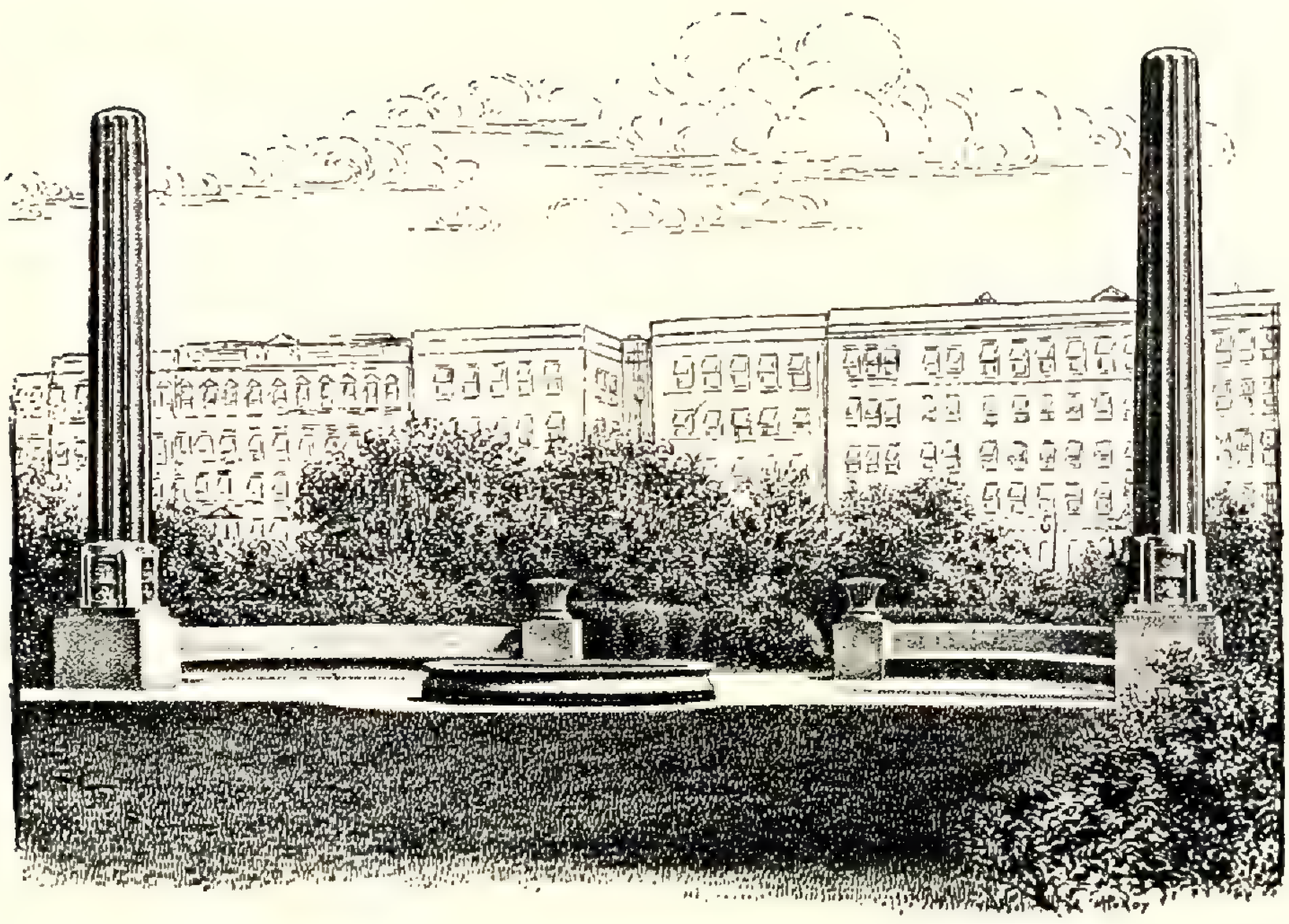
CONTAINING THE

TWENTY-NINTH ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1939



PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

BROOKLYN BOTANIC GARDEN

Scientific, Educational, and Administrative Officers

SCIENTIFIC AND EDUCATIONAL

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THE BOTANIC GARDEN AND THE CITY

THE BROOKLYN BOTANIC GARDEN, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (about $300,000) and of other permanent improvements (about $253,000) has been met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms of the annual Tax Budget appropriation.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden, from its beginning, to purchase all books for the library, all specimens for the herbarium, all lantern slides and photographic material, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all purposes, are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual, by annual payment of	$ 10
2.	Sustaining, by annual payment of	25
3.	Contributing, by annual payment of ..	100
4.	Life, by one payment of	500
5.	Permanent, by one payment of	2,500
6.	Donor, by one payment of	10,000
7.	Patron, by one payment of	25,000
8.	Benefactor, by one payment of	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to eight carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

Note: *Contributions to the Brooklyn Botanic Garden, through membership dues or otherwise, constitute proper deductions under the Federal Income Tax Law.*

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

.....

.....

* The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.

FIG. 1. Cherry Walk, Monday, May 8, 1939. Facing north. Registered attendance at the Garden May 6–7 (Cherry Blossom Sunday) was 43,581. (9827)

BROOKLYN BOTANIC GARDEN RECORD

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TWENTY-NINTH ANNUAL REPORT OF THE BROOKLYN BOTANIC GARDEN 1939

REPORT OF THE DIRECTOR

TO THE BOTANIC GARDEN GOVERNING COMMITTEE:

I have the honor to present herewith the Twenty-Ninth Annual Report of the Brooklyn Botanic Garden for the calendar year 1939.

It would seem as though every scientific and educational institution in the United States of America should begin its annual report for 1939 with a prayer of thanksgiving that it is located where it is. In contrast to the conditions in some other lands, we have been free to pursue a program of scientific investigation and education without interference from governmental ignorance or bigotry, while we have witnessed elsewhere the appearance of such irrelevant classifications as "Soviet ecology," "German mathematics," "Aryan physics," and other misleading designations for the different branches of science.

In the *Journal for Ecology and Biocenology,* published by the Leningrad State University, we read that, "The Revolution has reconstructed our science in general and biology in particular." "Soviet ecology," we are told, "is of increasing importance for Socialist Construction." In Germany a new mathematical journal, named *Deutsche Mathematik,* is devoted to nationalism, *versus* internationalism, in mathematics. "German physics?," asks Lenard, a Nobel Prize laureate, in the first volume of a great work

called "Deutsche Physik"; "I might rather have said Aryan physics, or the physics of the Nordic species [*sic*] of man . . . the physics of the very founders of the science." According to a recent news item, German investigators, by a governmental decree, are required in their bibliographies to list the cited authors separately according to race.

In the United States, scientific investigators, no matter in what subject, have been free to pursue the truth as it is, and to proclaim it without the necessity of having to try to bring it into conformity with any political or sociological or racial ideology. No investigator or teacher of science has suffered in loss of position, social status, or otherwise for proclaiming the results of his research and his interpretation of them arrived at with entire freedom of thought and work. Science in this country is reconstructed solely on the basis of new facts and principles revealed by research, and not arbitrarily, with an attempt to bring it into harmony with any current propaganda of political revolution. No scientific books have been burned in this country because of the race or religion of their authors, or because their contents or their authors were not in agreement with some prevailing conception of the state. In other words, we have not, in this country, reverted to the Middle Ages in the administration of our science and education.

It is true that the Brooklyn Botanic Garden, together with practically every other institution dependent on either public or private support, has operated with diminishing resources during the past ten years. This is due, in large part, to the failure of men to apply the method and spirit as well as the results of science to the practical affairs of life. And no problem that confronts the human race, outside the realm of religion and morals, is of more urgent importance than to provide continuing adequate support for institutions of science and education. Such institutions cannot remain static; they must either go backward or forward. Hitherto, they have been able to depend, in large part, on private benefactions. Private benefactions are derived from surplus of income or capital, but in these days it seems to be the deliberate intention of government to abolish surplus by excessive taxation. It is like planning to get water for irrigation, or power to generate electricity, by draining the great federal dams.

The resultant problem for scientific and educational institutions is to adjust themselves for the time being as best they can, in the hope that support which has hitherto been available in the form of generous annual gifts, and which has been gradually fading away chiefly because of taxation, may in some measure, at least, be replaced by bequests, and by a substantial increase in the number of smaller contributions.

And while gifts of private funds have been falling off because of the mounting burden of taxation, governmental agencies, federal, state, and municipal, have been reducing their annual tax-budget appropriations for scientific and educational institutions. All this is now a truism, but it needs to be clearly in mind when estimating the present status and current accomplishments of these institutions.

What is a Botanic Garden?

There is an old story of an evangelical preacher who based his sermons all one winter on the same text because, he said, he had never found any gospel messages so much needed as those which grew out of that text. An experience of more than thirty years in botanic garden administration has emphasized to the writer the perennial necessity of interpreting to the public just what a botanic garden is.

One never thinks of a museum as a place to do something; he goes primarily to see something; it is the constant hope of the director and staff that he comes to learn something. Of course, if he does not derive pleasure from his visit the museum will have measurably failed in its purpose as a museum. It is essentially for education.

So also with the plantations of a botanic garden. They may, superficially, look like a park. Within certain limitations the "garden" may be used as a park—as a place for passive recreation. *But that is not primarily its purpose.* If it were, the whole plan and planting would be different than they are. The plantations of a botanic garden are essentially an outdoor museum. They are intended primarily to serve an educational end. They are laid out with that object in view, and must be so administered if the garden is to justify its name and its very existence. Of

course, many visitors come to a botanic garden, just as they go to a museum, primarily for passive recreation—to enjoy its beauty, to withdraw from the noise and confusion of the city. No experienced botanic garden administrator could ever harbor any illusions about that. Nor would he wish to. It is a laudable aim, and the Botanic Garden here serves a very useful purpose. But, as with a museum, *recreation is not the primary aim of the botanic garden,* and experience shows that multitudes do come for a purpose that rarely takes them to a park, namely, to learn something about plants and horticulture; and, like a museum, a botanic garden should be planned and administered chiefly with a view to serving the latter group.

But when we are less largely pedagogues and more largely human beings, we recognize the fact that it is as important to be happy as to be learned. In *The Human Situation,* which one reviewer has called "perhaps the most important book of its kind which the twentieth century has yet produced," the author, W. MacNeil Dixon, says: "I am less enamored of truth than of beauty. If I could spend the course of everlasting time in a paradise of varied loveliness, I do not fancy my felicity would be greatly impaired if the last secret of the universe were withheld from me."

And so, while the primary aim of a botanic garden is educational, we should minister not only to those who come to learn the Latin name of the Lilac, or what plant family comes between the Buttercups and the Roses, or the latest variety of Iris, but also to those who come to seek only happiness amidst beauty. And thus it becomes a fundamental aim to make the Botanic Garden as beautiful as possible. The gift recorded below is a major contribution to the beauty of the grounds.

The Dean Clay Osborne Memorial

The preceding Annual Report recorded the generous gift of Mrs. Sade Elisabeth Osborne, Executrix, a member of our Board of Trustees, of the architectural features (fountain, water basins, seats, and columns) at the north and south ends of the Long Green, in the Horticultural Section of the Garden, lying between the Brooklyn Museum site on the east and Mt. Prospect Park on

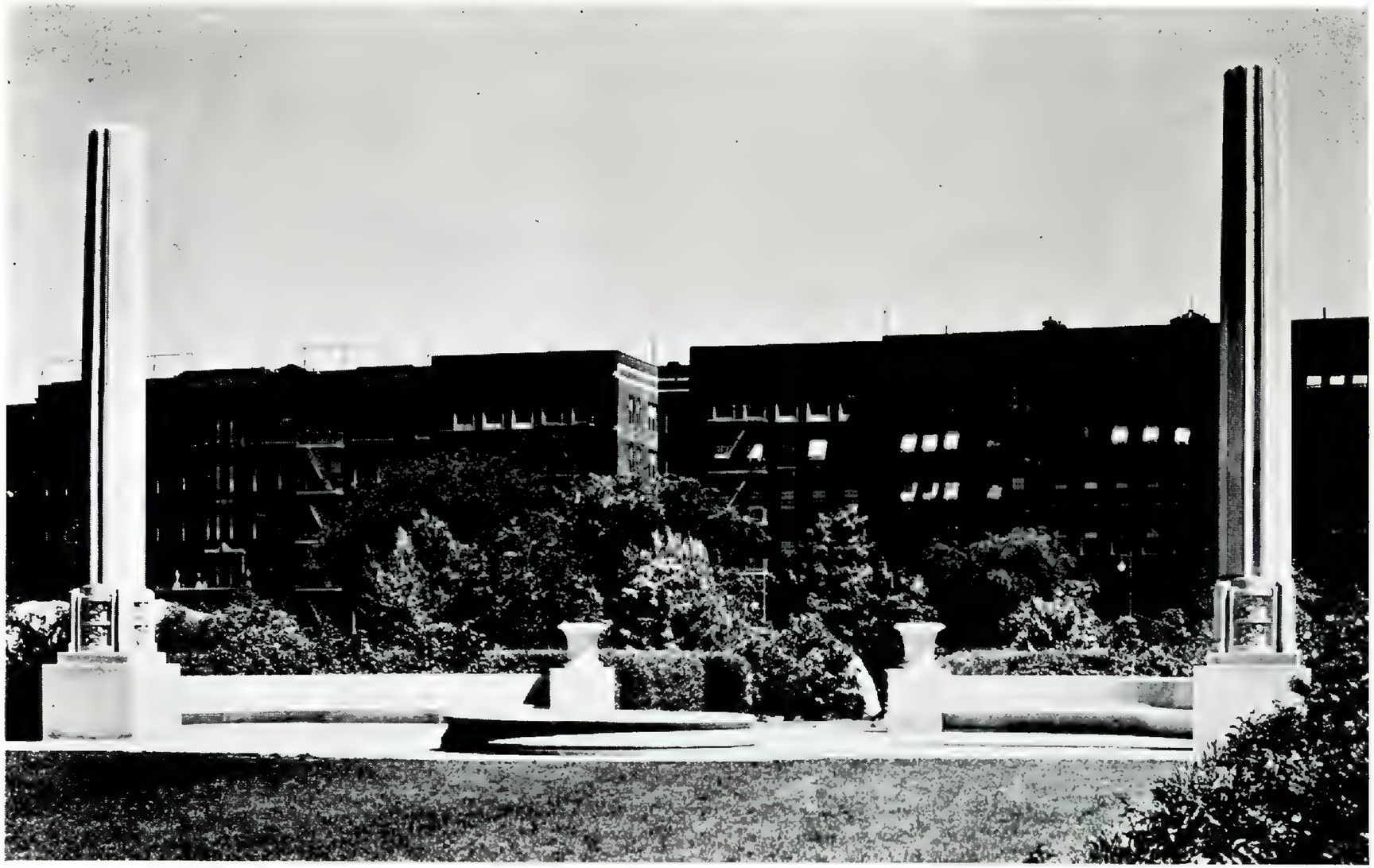


FIG. 2. The Dean Clay Osborne Memorial: Columns, Water Basin, and Seats at the north end of the Long Green, near Eastern Parkway Entrance. See Fig. 3. (9910)

the west. The gift, reported to the Board at its meeting on October 13, 1938, was made in memory of Mrs. Osborne's husband, Dean Clay Osborne, deceased January 23, 1937. Work on the memorial, designed by our landscape architect, Mr. Harold A. Caparn, began in August 1938; it was suspended on December 15 on account of winter weather. Work was resumed on February 3, and was completed, except for the flagstone paving, on March 9, 1939. It was formally presented on the afternoon of April 19, 1939, the wedding anniversary date of Mr. and Mrs. Osborne. The exercises were held in the Botanic Garden Auditorium with the following program: 1. *Presiding,* Mr. James G. McDonald, President of the Brooklyn Institute of Arts and Sciences; 2. *Brief address,* "The Significance of the Memorial," Dr. C. Stuart Gager, Director of the Botanic Garden; 3. *Presentation of the Memorial,* Mrs. Dean C. Osborne; 4. *Acceptance of the Memorial* on behalf of the Board of Trustees, Mr. Edward C. Blum, Chairman of the Board; 5. *Acceptance on behalf of the Botanic Garden Governing Committee,* Miss Hilda Loines, Chairman of the Committee.

A sudden downpour of rain just at the close of the exercises in the Auditorium interfered with the inspection of the Memorial. Tea was served in the Rotunda of the building by the Woman's Auxiliary. About 250 persons were present.

The Plantations

The Hurricane of September 21, 1938, recorded in the preceding Report, necessitated a great deal of replacement during the first half of the year. About 55 trees were felled by the wind, including most of the hedge of Lombardy Poplars (*Populus nigra* var. *italica*) planted nineteen years ago along the Washington Avenue border of the Garden. The work occasioned by the hurricane is recorded in the appended report of the Horticulturist (pp. 88–95).

The Drought.—A severe drought of twelve weeks duration in the spring and summer of 1923 (April, May, and June) is recorded in the Botanic Garden Record for October of that year. The precipitation for the three months was 4.24 inches below the

normal of 9.74 inches for the preceding 58 years. The drought was broken on July 4–6, but drought conditions continued throughout most of August and September. The brown lawns showed almost no trace of green color, leaves dropped from some of the trees, and xerophytic plants like *Pachysandra terminalis* wilted to the ground. The damage to conifers was very great.

The drought of 1939 was the most severe since 1923. A spring excess of rainfall of approximately 5.0 inches was eliminated on May 21, after which the deficiency continued to pile up, reaching one inch on June 2 and 1.84 inches on the 12th. Slight rains during the second ten days of June reduced the deficiency materially, but they were so distributed as to be of little avail for vegetation. By June 29 the shortage had again increased to 2.00 inches. The rain of June 30 (1.80 inches) was not sufficient to wipe out the deficiency, which again increased to about 3.0 inches by the end of July, and to 5.18 inches by the 18th of August.

A rain of 3.00 inches on the 19th of August cut the deficiency nearly in half, but by the close of the month it rose again to 3.00 inches. The rains of September (1.21 inches *vs.* 3.39 inches normal) were of little consequence, and by September 30 the dry period left a total deficiency of about 5.00 inches. This was reduced by October rains to an accumulated deficiency of 3.41 inches; but the October precipitation, like that of the other months, was distributed "in driblets," and so was of little advantage to plant life.

The precipitation for November (1.47 inches *vs.* 2.96 inches normal) left an accumulated deficiency of 4.90 inches from January 1. In December the precipitation of 1.22 inches was 2.40 inches below normal, making an accumulated deficiency for the year of 7.30 inches.

Combined with the deficiency of rainfall, abnormally high temperatures prevailed throughout the summer with an accumulated excess of 521.0° as of October 31. These high temperatures, of course, tended to increase the loss of water by transpiration from the leaves and other exposed surfaces of the plants. This was counteracted in part by the excessive humidity which prevailed during the summer, but the net result was a condition of severe drought for the plants, necessitating almost continuous irrigation

from May to the middle of October. This saved the plants from suffering as severely as they did in 1923. In fact, one would hardly have been able to infer a drought from the fall appearance of the plants and lawns.

FIG. 3. The Dean Clay Osborne Memorial. Detail of Panel at the Base of one of the Fluted Columns shown in Fig. 2, showing Design of Ginkgo Leaves and Fruits. See Fig. 2. (9911)

The excessively low temperature of 27° F., recorded on April 13, was reported as the lowest for that date in 65 years, but the mercury went to 83° F. on the 25th. There was a spring deficiency (March 21 to April 30) of 26 degrees. Such wide and sudden fluctuations above and below the freezing point, especially in late spring, are quite detrimental to plant life.

The Eastern Parkway Gate.—In the preceding report we recorded the setting of the Eastern Parkway fence back about 44 feet from its original location at the sidewalk. During the year the areas on each side of this fence were paved with hexagonal blocks by WPA workmen under the supervision of the Department of Parks, but the grading and restoration of walks on the Garden side of the fence were not completed by the end of the year.

A new portal at this entrance, for which plans have been made by the architects, McKim, Mead and White, is one of the urgent needs of the Garden.

Mt. Prospect Park, on the site of the old Mt. Prospect Reservoir, adjacent to the Garden, was opened to the public on Saturday, May 27, with formal exercises at which the Garden was officially represented by Chairman Edward C. Blum of the Board of Trustees, President James G. McDonald of the Brooklyn Institute, Miss Hilda Loines, Chairman of the Botanic Garden Governing Committee, and the director of the Garden.

A fire on the border mound just inside the north Flatbush Avenue gate was discovered in the leaves and grass in the late afternoon of June 7. A policeman turned in an alarm, and the fire company extinguished the blaze. This is the third fire that has occurred on the Flatbush Avenue border mound, and the second in this identical location. Apparently, these fires result from the careless discarding of lighted matches and cigarettes. This is only one of the innumerable occurrences which emphasize each year the importance of having guards at our gates. If there had been a guard at the gate this fire would have been promptly detected before it had done much damage and would have been extinguished without having to call out a fire company.

The condition of the paved walks has been growing worse for several years. An appropriation for resurfacing a portion of the walks was granted in 1932. Subsequent requests for appropriations to complete the work of resurfacing have not been granted. The walks have now become really dangerous in places. During the year the ambulance was called to the Garden three times on account of turned ankles suffered by visitors. In one case the Garden was obliged to pay, out of private funds, a claim for

damages. The walks are really beyond the stage where patching will suffice. What is needed is a reconstruction of the surface throughout most of the Garden.

Attendance

The total attendance for the year of 1,798,029 is nearly 72,000 more than for 1938, and is the largest in the history of the Garden. For the four months of June, July, August, and September the attendance was 689,498, or more than 80,000 in excess of the attendance for the corresponding months of last year. Whether, or to what extent, the World's Fair may have been a factor in this increase it is difficult to say. The lack of rain was favorable for attendance, but the heat was excessive and this usually sends people to the seashore or out of the city and so makes for a smaller attendance. The increase in general attendance may be attributed in part to the attendance of 80,270 in classes from the schools, an increase of more than 41,000 over 1938.

Week-end attendances (Saturday, 12–6 p.m. and Sunday, 10 a.m.–6 p.m.) were as follows: April 29–30, 38,866; May 6–7, 43,581; May 13–14, 36,369. The attendance for April 30–May 1, 1938, was 56,145 or 12,564 more than the highest for 1939. It is the general impression that the chief factor in this falling off was the World's Fair, which opened April 30. Further data are given in the appended report of the curator of public instruction.

Botany for Every Man

Last year the Brooklyn Botanic Garden published statistics concerning the history, organization, and work of more than 550 botanic gardens located in 80 countries.[1] An analysis of these data shows that the Brooklyn Botanic Garden apparently has the most extensive program of popular education, for adults and children, of any botanic garden in the world. The year's educational work is summarized in the appended reports of the curators of public and of elementary instruction. Of a scientific and educational personnel of twenty-five, ten persons devote part of their time and fifteen persons, or 60 per cent. of the total, devote all of their time

[1] Gager, C. Stuart. Botanic Gardens of the World. *Brooklyn Bot. Gard. Record* **27**: 151–406. July, 1938.

to educational work or to curatorial care of collections (plantations, library, et cetera) required for the proper conduct of this work; this includes formal courses of instruction; lectures and addresses at the Garden and elsewhere; docentry for visitors to the plantations and conservatories; a bureau of free public information on all aspects of plant life and gardening; popular publications; advisory service and other cooperation with the Department of Parks, the Board of Health (City hospitals and other institutions), the Board of Higher Education (City colleges), and the Board of Education, with extensive service to the public, elementary, and high schools of the City (including the supply of large quantities of plant material for study and for the beautification of classrooms), and the formal teaching of some 80,000 pupils in the City schools who came to the Botanic Garden with their teachers for instruction.

Of those devoting all their time to education (services to City departments and to the general public), nearly 63 per cent. of the total salaries is provided from Private Funds; of those devoting half time or less to education, more than 65 per cent. of the total salaries is derived from Private Funds, the remainder, in each case, from the City Tax Budget.

Science is for the Public

"To the flourishing of science. To that science which does not fence itself off from the people, which does not keep itself at a distance from the people, but is ready to serve the people, is ready to pass on all the conquests of science to the people, which serves the people not from compulsion but voluntarily, readily." This quotation, from Joseph Stalin, is taken from one of the wall panels in the U.S.S.R. Building at the New York World's Fair, 1939.

The quotation is given here not because it states anything new, but because it states so concisely and with emphasis that which has always been the aim and the contribution of science and of scientists themselves in all lands and at all times, especially in democracies— to serve "the people not from compulsion but voluntarily, readily." During the past decade we have witnessed the strange anachronism of a national government giving and withholding

FIG. 4. Gate at South Washington Avenue Entrance. One of several Features made possible by the Maddock Bequest. (9815)

recognition of scientific workers and their contributions on the basis of national and racial origins; but with this, almost if not quite, unique exception, it has been the universal practice of national governments to promote chiefly the advancement and dissemination of "that science which does not fence itself off from the people . . . but is ready to serve the people." This has been specially true of the modern democracies, as witness the support of Pasteur's work by Government in France; the governmental support of the Royal Botanic Gardens at Kew and Edinburgh, the Rothamstead Agricultural Experiment Station, and the National Astronomical Observatory at Greenwich by England; the National Bureau of Standards, the Department of Agriculture, the Geological and Geodetic Survey, the Health Service, the Bureau of Forestry, and other official scientific departments and bureaus of the United States Government and the Governments of the various states of the Union, and other instances too numerous to mention.

It was in harmony with this normal point of view of science that the Brooklyn Botanic Garden, in the first year of its existence, stated its aim as "for the advancement of botany *and the service of the city,*" and parallel with a plan of scientific research developed a program of public education, and organized its plantations with that aim chiefly in view. It is specially pertinent for a botanic garden to recall that one of the first opportunities in America for teachers to study science was given by a botanist when Asa Gray, professor of botany in Harvard University, announced sixty-eight years ago (in 1871) that teachers who could not take his courses during term time would be given an opportunity to attend during the summer vacation. This was not only the beginning of the "summer session," now common in most of our universities; it was a pioneer step in adult education.

Exhibits and Formal Instruction

The feature that most distinguishes museums and botanic gardens from other types of educational institutions is the maintenance of labeled collections of objects for observation and study. But it is the common tendency for visitors to gain from the exhibits only individual notions, or *percepts,* and to be satisfied with percepts, rather than to gain general notions, or *concepts,* or

voluntarily seek to gain concepts. For example, in our Conservatory exhibit installed to illustrate the concept of "the evolution of the Plant Kingdom," most unconducted visitors appear to be interested chiefly or wholly in the individual plants and not in the evolutionary sequence of the different types of plants. This, notwithstanding the labels and diagrams displayed with the plants, and a special method of installation, all intended to call attention to and to teach the probable sequence of types in the development of the plant kingdom through the ages. Practically all comments overheard from casual visitors are about individual plants; rarely, if ever, are there comments about the sequence of forms or the effectiveness of the installation to illustrate the evolutionary sequence.[1] (See Fig. 9, p. 85.)

And so it is important for museums and botanic gardens to provide teaching guides, lectures, and courses of instruction to supplement the labeled collections and increase their educational effectiveness. Our exhibit on "Evolution of the Plant Kingdom" is educationally most effective when visited by a class under the guidance of its teacher or of a Botanic Garden instructor.

Broadcasting.—During 1939 thirty-four broadcasts were given on the Botanic Garden and various aspects of plant life and gardening. Twelve of these were over WOR in cooperation with the Radio Garden Club, conducted by the Extension Service of Rutgers University. A list of subjects and stations is given in Appendix 4 (page 133). According to WOR officials, the Botanic Garden is given $240 worth of time for each broadcast.

Extra-Mural and Intra-Mural lectures, to the number of 123, have been given by various members of the Garden personnel in cooperation with other organizations and institutions, including 35 lectures to schools, with a total attendance of 21,380. These are listed in Appendix 3 (page 125).

Publicity and Publication.—As noted later, much additional publicity resulted from our five exhibits at the World's Fair. Some 950 clippings have been received, based on the official news releases sent out by the Department of Public Instruction, and also of independent origin.

[1] A similar experience in the behavior or reaction of visitors to a museum is discussed by Mildred C. B. Porter in *Publications* of the American Association of Museums, Number 16. Washington, 1938.

Popular and semi-popular articles and reviews by members of the Garden personnel have been published during the year to the number of 77, in addition to 17 technical publications. All of these are listed in Appendix 2 (p. 120). Thirty-eight news releases have been prepared for the press.

Research

One of the popular fallacies about scientific research is the impression that its results benefit only a small portion of the public. To hold that conception is to lose sight of the fact that the entire body of human knowledge has resulted from research—from thoughtful, unprejudiced, persistent inquiry concerning the world about us. It is a truism to remark that without research our entire program of public education would be impossible. And we should not depend merely on knowledge that became available centuries or decades ago and which has become general public information. If our teaching is to be reliable and vital we must take account of the results of current research as they become known. The Brooklyn Botanic Garden is the daily beneficiary of research done elsewhere; it is highly fitting that we should also be making contributions to our knowledge of plant life as a service, not to the few, but to the general public.

Reports of progress on research under way during the year are given on pages 51 to 69. The subjects include the fundamental problem of disease resistance in plants and the Japanese Iris project (Dr. Reed and collaborators); the breeding of a chestnut tree resistant or immune to the disease that has destroyed nearly all the American chestnuts (Dr. Graves and assistants); systematic botany and studies of the local flora (Dr. Svenson and assistants); flower structure and ontogeny, and its bearing on the phylogeny and classification of the Dicotyledons (Dr. Gundersen); experimental genetics of the Boston Fern—*Nephrolepis* (Dr. Benedict); economic plants (Dr. Cheney).

Botanical research by our own staff, as we have often stated before, is important for the proper administration of our collections and the enrichment of our educational work; it is of the very essence of the advancement of botanical science which is one of the purposes for which this botanic garden was established, as

stated in the original Act of 1897, of the State Legislature: for "the advancement of botanical science and knowledge, *the prosecution of original researches therein* and in kindred subjects." The advancement of knowledge, like its dissemination, requires funds. The total results of botanical research—economically, socially, aesthetically, educationally—are large out of all proportion to the amounts that have been and are being expended for its promotion. During the twenty-nine years of the Garden's existence it has had one large gift ($50,000) exclusively for the purpose of research; three friends have for the past nineteen years made generous annual contributions for this work; but the total amount available during these years has been meager in proportion to its requirements and importance. The results have more than justified the modest sums that have been expended.

An analysis of the Brooklyn Botanic Garden budget for 1927 showed that approximately 24 per cent. of the total was for research. An analysis of the 1938 budget showed that only 9.15 per cent. was applied to research—a falling off of nearly 15 per cent. in eleven years. The figures for 1939 are substantially the same as for 1938. Endowment for research is one of our most urgent needs.

The Library

The library not only serves the needs of our own staff, but is open free daily (except Sundays and holidays) to the general public, and its use by the public tends to increase each year. The librarian (pp. 100–104) reports a total attendance of 5,627 (as against 4,595 in 1938), accessions of 244 books, 689 pamphlets, and 5,865 parts of publications; books loaned to other institutions 69, and books borrowed from other libraries 20. It may be noted again that publications are not loaned to individuals but only to other libraries.

The Mrs. George White Field Memorial.—"Mrs. Field's Literary Club," a woman's club of Brooklyn, was organized in 1884 by Mary Jones Field (Mrs. George White Field), whose death occurred in February 1934. At its meeting on April 20, 1939, the Club voted to contribute $500 to the Brooklyn Botanic Garden for the purchase of rare and important books as a memorial to Mrs.

Field, each book to bear a special bookplate. A full report of this valued and highly appreciated gift may be found in the Report of the Librarian. The books, on special shelves in one of the locked cases in the library, constitute a lasting memorial to one who was formerly important in the cultural life of Brooklyn; at the same time they meet a real need and serve a very useful purpose.

The hope is again expressed that in the not too distant future the library may come into a substantial endowment fund, and also a fund so urgently needed for the accumulated binding.

The Herbaria

Accessions to the Phanerogamic Herbarium total 4,524 specimens. We have sent 540 specimens in exchange to other institutions, and 555 duplicates by gift to individual collectors. By exchange and purchase 314 specimens have been added to the Mycological Herbarium. It is hoped that the maintenance of the herbaria may be ultimately provided for by endowment, on a scale commensurate with their importance. During the year $150.00 was added to this new endowment fund, bringing the total to $2,345.04.

Publications

A report on publications issued by the Garden, either independently or cooperatively, may be found on page 138.

Genetics, Incorporated

In December, 1921, we entered into an "Agreement" with the Editorial Board of *Genetics* for cooperation in the publication of that bimonthly journal. By the "Agreement" the editing was in charge of the Editorial Board and the business management was in charge of the Garden.

By good fortune, the journal gradually acquired a small margin for investment, and this necessitated the formation of a Corporation for investing and administering these and any subsequent funds. Through the generous assistance of the law firm (Mudge, Stern, Williams and Tucker) of Mr. Alfred E. Mudge, of the Botanic Garden Governing Committee, a Corporation was formed as of May 10, 1939, under the laws of the State of New York,

known as "Genetics, Incorporated." The incorporators and the officers of the corporation for the first year are as follows: *President,* Prof. Leslie C. Dunn, Columbia University; *Vice-President,* Prof. George H. Shull, Princeton University; *Secretary-Treasurer,* Dr. C. Stuart Gager, Brooklyn Botanic Garden. The other incorporators were Dr. Charles B. Davenport, Station for Experimental Evolution of the Carnegie Institution of Washington, Cold Spring Harbor, Long Island, and Dr. Donald F. Jones, geneticist, State Agricultural Experiment Station, New Haven, Connecticut.

At its first meeting, on June 2, 1939, the Board of Directors passed a vote of appreciation and thanks for the services of the law firm of Mudge, Stern, Williams and Tucker, and, in particular, to Mr. Harlowe E. Bowes, of that firm, for the legal services and advice so generously rendered in connection with all the steps and work required to bring about the incorporation of "Genetics, Incorporated," including the preparation of the Certificate of Incorporation, the first draft of the By-Laws and other legal papers; for the filing of the Certificate of Incorporation, for the drawing up of a new "Agreement" with the Corporation, for the carrying on of necessary correspondence, for stenographic services, for conferences and consultations, and for the use of its conference room for the two required meetings of the members of the Board.

It is a pleasure to make acknowledgment here of these generous services with the thanks and appreciation of the Governing Committee and the director of the Botanic Garden.

Incorporation made it necessary for the Garden to enter into an "Agreement" with "Genetics, Incorporated," to take the place of the old "Agreement" with the Editorial Board of *Genetics.* In the new "Agreement," as in the old, the business management of *Genetics* is vested in the Brooklyn Botanic Garden, which appoints the business manager, who is an officer of the Garden and not of Genetics, Incorporated. The present director of the Garden, now serving as business manager of *Genetics,* was also elected secretary-treasurer of the Corporation. The full text of the new "Agreement" may be found as Appendix 9, beginning on page 139.

The World's Fair, 1939

Our two preceding reports contain summaries of the steps, initiated by the Brooklyn Botanic Garden in 1937, leading to the organization of "Hortus, Incorporated," and the installation under its supervision of "Gardens on Parade," the horticultural exhibit at the New York World's Fair, 1939. As previously reported, friends of the Brooklyn Garden underwrote $10,000 of the total of $235,000 for financing this project. The Fair authorities assigned to Hortus, Incorporated, a tract of a little more than five acres for the exhibit, and the "cornerstone" of the pavilion on this site was laid on Friday afternoon, October 21, representatives of the Botanic Garden being present, as noted in our preceding annual report.

The "Sponsoring Societies" of Hortus, Incorporated, in addition to the Brooklyn Botanic Garden, are: The Horticultural Society of New York, New York Florists Club, Society of American Florists and Ornamental Horticulturists, and the New York Botanical Garden.

Early in May invitations were issued by "The President and Officers of Hortus, Incorporated" to the formal opening of "Gardens on Parade," on Thursday morning, May 18, at eleven-thirty. Mrs. Harold Irving Pratt, president, presided, and brief remarks were made by Hon. Grover A. Whalen, president of the Fair; Mr. Stephen F. Voorhees, chief designer; Mr. William Adams Delano, architect (whose firm designed the pavilion); Major Gilmore D. Clarke, consulting landscape architect of the Department of Parks of New York City; and Col. John P. Hogan, vice-president and chief engineer of the New York World's Fair. The admission price to "Gardens on Parade" was at first 40 cents (in addition to the general admission to the Fair of 75 cents); later it was reduced to 25 cents.

Exhibits at the Fair

Knot Gardens and Herb Garden.—Two Elizabethan Knot Gardens and a Culinary Herb Garden, designed and laid out by our horticulturist, Mr. Free, were maintained as permanent exhibits throughout the period of the Fair, which closed on Tuesday,

October 31. A fuller account is given in the appended report of the horticulturist (p. 88).

A large colored illustration, in perspective, of the Knot and Herb Gardens, 40 by 90 inches, done in water colors by Miss Michalena La Frere Carroll, of our personnel, was exhibited on Brooklyn Botanic Garden Day and for a few days thereafter.

Japanese Iris.—In cooperation with the State Institute of Applied Agriculture, Farmingdale, Long Island, an exhibit of growing plants of Japanese iris varieties was made at the World's Fair. The plants selected were from the collection which the Botanic Garden has built up in the course of several years, including the material secured by Dr. and Mrs. George M. Reed on their trip to Japan in 1930. They were grown at Farmingdale in cooperation with the Institute. One hundred nineteen varieties, each represented by three plants, were installed in "Nyssa," the World's Fair garden of the Institute. The plants were on display from June 16th until July 7th.

From June 17th to July 17th, 60 watercolors of Japanese iris done by Miss Louise Mansfield and Miss Maud H. Purdy, were exhibited in the Exhibition Hall of "Gardens on Parade." These illustrated four of the wild types and 56 garden varieties, showing the range of variation in color, size, and shape.

From July 17th to July 27th, 45 watercolors of iris species, varieties, and hybrids, by the same artists, were exhibited. About two-thirds of the watercolors illustrated the iris of the Southern United States, mostly our own hybrids. The parents and first hybrid generation plants of *Iris virginica* × *I. laevigata,* as well as a few species from various parts of the world, were on display.

In the New York City Building we installed a general exhibit comprising a collection of rare and unusual growing plants; a 2 feet by 5 feet model of our Children's Garden; photographic prints, 32 by 42 inches, enlarged from negatives by our photographer, Mr. Louis Buhle, showing views in the Garden; and, printed on the wall, a brief outline of the features of the Garden considered as "Gardens within a Garden." This entire exhibit was installed by Mr. Free, following a layout by Skidmore and Owings, architects, New York City.

In the New York State Building, Long Island Section, there

were exhibited several views of our grounds and our educational work. These views were enlarged from negatives by Mr. Buhle. The Garden had, altogether, a total of seven exhibits at the Fair.

Brooklyn Botanic Garden Day at "Gardens on Parade" was held on Monday, July 17, from 2 to 6 p.m., in conjunction with New York Botanical Garden Day. The guest of honor was Captain F. Kingdon Ward, F.R.G.S., the well known plant explorer. Members of our personnel and of the Woman's Auxiliary were in attendance to answer questions about the Garden and its work.

Attendance.—It is estimated that the Knot and Herb Gardens had approximately 735,000 visitors, according to attendance figures given out by the "Gardens on Parade" authorities. In addition, many thousands viewed the exhibits in the New York State and New York City Buildings, the Iris Exhibits, and the exhibits in the Exhibition Hall of "Gardens on Parade."

Special Publicity.—Announcements concerning the exhibits at "Gardens on Parade" were sent by the Director of Publicity of Hortus, Incorporated, Mr. Bernard H. Goldenson, to more than 600 newspapers, magazines, trade publications, and photograph syndicates in the United States, and also to selected publications in Canada, Mexico, and other countries. We have received scores of clippings about the Brooklyn Botanic Garden exhibit from publications throughout the country, and also requests for information about the Garden and its work.

Meeting of American Rose Society

Fall Rose Garden Day was held on October 5 in connection with the forty-first Annual Meeting of the American Rose Society, which met on the fifth and sixth of October as a guest of the Botanic Garden. The forenoon meeting of the Society was held at the Hotel St. George, which was headquarters for the convention. After luncheon at the hotel the members of the Society joined the members and staff of the Botanic Garden for inspection of the Rose Garden from 2:00 to 3:30 o'clock.

Exercises in the Garden auditorium, at 3:30 p.m., comprised a brief address of welcome by the director, a response on behalf of the Rose Society by its President Emeritus, J. Horace McFarland,

of Harrisburg, Pa., and an illustrated talk on "Making the Brooklyn Botanic Garden Rose Garden," by Montague Free. Mr. T. Allen Kirk, M.D., of Roanoke, Va., President of the Society, presided. Tea was served in the main floor rotunda of the Laboratory Building at 4:00 o'clock by the Woman's Auxiliary, Mrs. Edwin H. Thatcher being chairman of the committee on arrangements. There was an exhibit of cut roses by members of the Society.

The sessions of the Society on Wednesday morning, October 5, were held in the Garden auditorium, and were followed by a buffet luncheon in the rotunda, with exhibit of cut roses and rare books on roses, and a series of illustrations in color of patented roses, including the first plant ever patented, which was a rose. This exhibit was installed in the library by the library staff. On Wednesday afternoon the members of the Society visited rose gardens in private estates on Long Island.

Conference on Medicinal Herbs

A conference on medicinal herbs was held in the Laboratory Building on Thursday evening, October 18, based on the recent development of a Medicinal Plant Garden at the Brooklyn Botanic Garden, which appears to be the first garden of medicinal plants in New York City since the Elgin Botanic Garden, which was established by Dr. David Hosack in 1801, on land now occupied by Rockefeller Center, and discontinued about 1815. That garden gave special attention to plants that "possess medicinal properties." The program was as follows:

1. History of the use of plants in medicine. Dr. Howard W. Haggard, Director, Laboratory of Applied Physiology, Yale University.

2. Modern use of plants in medicine. Dr. Ernest Fullerton Cook, Professor of Operative Pharmacy, Philadelphia College of Pharmacy, and Chairman of the Revision Committee, U. S. Pharmacopoeia, 1930.

The auditorium meeting was followed by a reception and an exhibit of Rare Old Herbals in the Botanic Garden library.

The program was arranged by a Committee on Arrangements representing the cooperation of other institutions as follows:

Walter A. Bastedo, M.D., representing The New York Academy of Medicine.

Dean Jean A. Curran, M.D., representing The Long Island College of Medicine.

Frederick Schroeder, M.D., representing Kings County Medical Society.

William H. Weygandt, D.Phar., representing Brooklyn College of Pharmacy.

Ralph H. Cheney, Sc.D., Chairman, representing Brooklyn Botanic Garden.

About 250 persons attended, including students from the Long Island College of Medicine and the Brooklyn College of Pharmacy.

Cooperation

Works Progress Administration

Our cooperation with the various Relief Administrations, which began in 1931 with the Emergency Unemployment Relief Committees, has continued without interruption with various City and Federal Relief "Committees" and "Administrations" through to the close of 1939. The various units are recorded in the eight preceding Annual Reports.

Our present project began in 1933 under CWA (Civil Works Administration) and ERB (Emergency Relief Bureau). On August 1, 1935, it was changed to WPA (Works Progress Administration), Service or Job Number 465–97–3–69, and this continued through June, 1939.

On July 1 the Works Progress Administration (WPA) and the Public Works Administration (PWA) were consolidated under one head, with the name "Works Projects Administration," thus retaining the abbreviation, "WPA," with a new connotation. Under this set-up our Official Project Number is 65–1–97, and the Service or Job Number is 23.

In July there began a nation-wide layoff of the WPA workers who had been enrolled for eighteen months or longer. During the first six months of 1939 the Botanic Garden had 17 WPA workers —men and women, in various kinds of work. A few of these had been at the Garden continuously for some six or seven years.

By July 25, these persons (except one gardener who left August 31) together with all those of more recent assignment had all been laid off, including Miss Sadie M. Hiller, who began under the EWB in March, 1932, and Mr. Emil Barens, who came to us under EWB in 1932. During the past seven years Miss Hiller has had charge of our extensive collection of photographic negatives and prints, and lantern slides, under the general supervision of Mr. Stoll, custodian. Mr. Barens was assigned to the Department of Plants, under the supervision of Dr. Gundersen, curator. The work of both these departments became adjusted to the services rendered by these two WPA assistants and their loss is keenly felt. Somewhat similar conditions resulted in other departments through the loss of WPA assistants of shorter periods of assignment. Unfortunately, the Botanic Garden has no funds available for retaining any of these workers on our regular payroll.

At the close of 1939 we had eleven WPA workers. Their services included bookbinding, stenographic, clerical, and typing assistance; recording of lantern slides and negatives; translating; greenhouse work; and messenger service.

Board of Education

Our work in cooperation with the elementary and high schools of the City is recorded in the appended reports of the curators of Public Instruction (High Schools) and Elementary Instruction (Junior High and Elementary Schools).

Special attention is called to the fact that the number of pupils brought in classes was more than double the number brought in 1938—80,270 *vs.* 39,632. Part of this increase was merely recovery of the normal number, which has averaged about 50,000 a year, previous to 1938. The falling off in 1938 was due to a combination of circumstances. Part of the 1939 increase was due to the fact that the WPA supplied a number of teacher-guides who brought many classes in addition to those brought by regular class teachers.

Study Material (living plants and plant parts, Petri dishes, etc.) was supplied to 4,742 teachers in 202 different schools for the instruction of 281,729 pupils. For 1938 the figures were 2,888 teachers in 168 schools, and 159,441 pupils.

Penny Packets of Seeds were supplied in a total number of 958,028 to pupils in 531 schools of all Boroughs of the City.

Potted Plants, to the number of 1,065, were placed in classrooms of 64 schools with 83,915 pupils in attendance.

Loan Lectures (lantern slides with lecture text) were supplied to 169 teachers for the instruction of 12,647 pupils.

Board of Higher Education

The annual scholarship assigned each year to a student in the Department of Biology of Brooklyn College for superior work in biology was awarded on September 29 to Miss Flora Green, who was nominated by the Committee on Scholarships and Prizes of the Department. Miss Green registered in course B14, "Trees and Shrubs of New York."

Some of the study material reported above under Board of Education was supplied to instructors in eleven colleges and universities.

Brooklyn College was, on May 11, given a quantity of aquatic plants for the water garden on the College campus. On June 7 we gave the College, for its new library, complete files, so far as available, of our *Record, Contributions,* and *Leaflets.*

Science Council and Science Teachers Clubs.—In connection with our service to high school biology teachers, Dr. D. Elizabeth Marcy, research assistant, set up an exhibit at the Annual Luncheon of the Science Council and Science Teachers' Clubs of New York City, held at the Hotel Astor on February 25th. The exhibit was entitled "Methods of Plant Propagation," and illustrated propagation by cuttings, offsets, runners, rhizomes, bulbs, grafting, and budding. Great interest was shown, and requests from teachers for this sort of material from the Botanic Garden have increased.

Miscellaneous Cooperation

World's Fair Commission of the City of New York.—On May 3 we supplied to this Commission one truck load of palms and other plants to be used for decorative purposes in the New York City Building at the Fair. Mayor Fiorello H. La Guardia is Chairman of this Commission, the Park Commissioner, Robert

Moses, Executive Officer, and Mr. Harry Sweeny, Jr., Park Director-in-Charge.

Department of Parks.—In April the arboriculturist, the district foreman, and two gardeners of the Prospect Park Personnel accepted our invitation to join one of our regular classes in its field trip to Prospect Park for the study of trees and shrubs.

On August 31 we supplied 100 cuttings of *Prinsepia sinensis* and 100 of *P. uniflora* to the Department of Parks.

Long Island Horticultural Society.—On January 17 this society held one of its regular meetings at the Garden. A talk on House Plants, illustrated by living plants, was given by Mr. Free. Tea was served by the ladies of the Garden personnel. After the lecture there was a tour of the Laboratory Building and Conservatories.

International Flower Show.—The thirteenth consecutive exhibit of the Garden was installed at the Flower Show in Grand Central Palace, March 13–18. The exhibit consisted of a collection of house plants, selected because they have been proved able to withstand, better than other plants, dry air and other unfavorable conditions of city apartments. The exhibit received a "Special Award."

The Garden Club of America, through its Library Committee, gave an exhibit from January 9 to February 14 of books, scrolls, paintings, and photographs relating to "Chinese Gardens and their Influence." The exhibits included a collection of "cut plant material of Chinese origin," supplied by the Brooklyn Botanic Garden.

The City Gardens Club, on January 10, held a special conference on "Smoke Abatement" in cities, Dr. Graves attended the meeting as a representative from the Botanic Garden, taking part in the discussion and answering questions concerning the effect of air pollution on trees and other vegetation in the city.

Columbia University.—As for several years past, classes in plant materials and horticulture of the School of Architecture made several visits to the Botanic Garden for the purpose of studying plant materials and types of gardens. The instructor is Mr. Howard R. Sebold.

Long Island University.—The scholarship in Botanic Garden classes, awarded annually, for superior work in biology to a stu-

dent of Long Island University, was awarded in 1939 to Miss Rose Auerbach, who enrolled in course B14, "Trees and Shrubs."

On April 20 a letter was received from the University expressing appreciation of numerous courtesies extended to the University by the Garden, and mentioning in particular the facilities of our library and conservatories, specimens supplied for exhibition and research purposes, the loan of lantern slides, and our course on tree identification.

Municipality of York, Western Australia.—In connection with plans of the Town Council for establishing an arboretum in York, and for developing it with reference to the needs of the education of children as well as adults, a request was received by us through the Department of Parks, New York City, for seeds of a selected list of trees. The intention of the authorities of the new arboretum is that trees from different parts of the country will serve in connection with the educational work for children in geography as well as in plant life. Seeds from ten species of trees growing in the Botanic Garden were sent to Mr. A. E. White, Town Clerk, in January.

The Atlanta (Georgia) Botanic Garden is now in the early stages of planning. In September Miss Adrienne Morris, of Atlanta, who is taking a leading part in this movement visited the Brooklyn Garden to learn of our plantations and activities. After returning to Atlanta she wrote: "I am sure I shall never again see space used to such advantage, and everything so beautifully planned. . . . I have talked so much of the Brooklyn Botanic Garden since I got back to Georgia that people are beginning to wonder if I actually saw any others."

California Spring Garden Show.—As reported by Mr. Free (p. 92), a portion of the exhibit of House Plants, which we installed at the International Flower Show in New York in March, was sent, by request, to the Tenth Annual Spring Garden Show, Oakland, California, in April, where it received a first award (Blue Ribbon). We also received a letter commending the fine condition of the plants on arrival, and mentioning our inclusion of "new" house plants. At the close of the show the plants were distributed to California dealers.

The American Institute Science and Engineering Clubs offered

a series of sixteen "Workshop Courses" during the spring of 1939. Two of these courses were given at the Botanic Garden by members of the teaching staff of the Garden, as follows: Course X, Nature study for camp counselors, by Miss Elsie Hammond; Course XI, Garden work for camp counselors, by Miss Frances Miner.

The American Museum of Natural History, through its Laboratory of Experimental Biology, has been checking up on frog colonies in New York City and vicinity, and a special permit was issued in May to their curator, Dr. G. K. Noble, to enter the Botanic Garden grounds after dark for the purpose of making observations on the amphibian colony in the Botanic Garden Lake, which includes the bull frog (*Rana catesbiana*) and Fowler's toad (*Bufo fowleri*).

The Y. W. C. A. sponsored "The World in Flower Arrangement" in their Central Branch Building on May 2. The Woman's Auxiliary of the Brooklyn Botanic Garden was one of several cooperating organizations. The purpose of the Flower Show was not to raise money but to promote an interest in flowers. The Garden supplied forty living plants to be used for an Italian decorated pushcart.

Twenty-fifth Annual Spring Inspection

The annual Spring Inspection for officials, members, and their friends was held, as always, on the second Tuesday in May, which fell on the ninth. The weather was favorable, and the Japanese flowering cherries were at their height of bloom. The following exhibits were on view in the Laboratory Building: 1. *Thirty paintings in tempora colors,* by Mrs. Amelia Johnson, of Plainfield, New Jersey; 2. Thirty paintings of garden flowers and wild flowers, by Mrs. J. Ralston Cargill, of Columbus, Georgia; 3. *Provost-fleurage,* ten designs in color, made of pressed Larkspurs, by Miss Eva Marian Provost, of Winter Park, Florida; 4. *Full size plaster model* from which the carved panels of the columns at the North Terminal of the Horticultural Section were made, showing foliation and fruits of the Ginkgo; 5. *Proposed Gate at Eastern Parkway:* Perspective in color by the architects, McKim, Mead

and White. Tea was served as usual in the Laboratory Building by the Woman's Auxiliary.

Woman's Auxiliary

Again the Woman's Auxiliary, under the presidency of Mrs. Henry Joralemon Davenport, has proved itself an indispensable part of the Botanic Garden organization. The Social Committee, with Mrs. Edwin H. Thatcher as chairman, had charge of the serving of tea at the Spring Inspection on May 9, the Twelfth Annual Rose Garden Day on June 13, and Fall Rose Garden Day on October 5.

A major service was rendered by the Auxiliary in connection with our spring canvass for new members of the Garden. More than 1,000 invitations to join the Garden were sent out by the members of the Auxiliary in the form of personal letters, enclosing printed matter supplied by the Garden. Each member supplied the postage for her own letters, and many members supplied names of prospective members. In addition to this a letter over Mrs. Davenport's signature, with folder enclosed, was sent to several hundred other names of the list supplied by the Garden. Many new members were enrolled as a result of this canvass.

At a meeting of the Botanic Garden Governing Committee, on June 16, the Director was requested to convey to Mrs. Davenport and the Secretary of the Auxiliary an expression of appreciation and the thanks of the Committee for this substantial service of the Auxiliary and its President.

Membership

Whatever may be the advantages of the steadily mounting burden of taxation, there is no question but that it operates to reduce the financial support of our museums, botanic gardens, et cetera from private individuals. Our enrollment of members is barely holding its own, and increase of taxes is the reason most frequently given for resignations. Membership data, as of the date of publication of this report, may be found on page 155.

Members enjoy numerous privileges in consideration of the payment of their membership dues. On May 26 we distributed

3,390 plants (mainly hardy chrysanthemums and cannas) to 226 members who called for them in response to our postcard notice.

Club Memberships

For many years the Botanic Garden has had the pleasure of cooperating in numerous ways with Garden Clubs, Women's Clubs, and other organizations of the Metropolitan area, and a plan has been adopted whereby such organizations may become definitely identified with the work of the Garden in promoting an interest in plant life and horticulture, as follows:

Annual Memberships.—Garden Clubs or other organizations may qualify as Annual Members of the Garden on election by the Board of Trustees and payment of the annual membership fee of Ten Dollars. Each member club may designate one of its officers or other member to receive such invitations, notices, and publications as go to individual annual members and to represent the club at all Botanic Garden functions, including flower days and annual Spring Inspection in May. The club may also have, without charge, the services of a Garden docent for a tour of the plantations or conservatories, followed by tea.

One member of the club is entitled to free tuition in most courses of instruction for which tuition is charged to non-members.

Sustaining Memberships.—Any club or other organization may become a Sustaining Member of the Garden on election by the Board of Trustees and annual payment to the Garden of the sustaining membership fee of Twenty-five Dollars.

Sustaining membership clubs enjoy the full privileges of annual membership, not only in the Botanic Garden but also in the Brooklyn Museum and The Institute at the Academy of Music. They may designate three members who may receive free tuition in most Botanic Garden courses of instruction for which tuition is charged to non-members.

Volunteer Services.—Through the Central Volunteer Bureau of the Junior League of Brooklyn (Mrs. Robert Ross Parker in charge) we obtained the volunteer services of Miss Ernita Rothmaler to organize our canvassing list in card catalog form, and give general supervision of the work over a period of several weeks. In addition to contributing her time, Miss Rothmaler took

out an annual membership in the Garden. The Governing Committee of the Garden, on June 16, adopted a resolution of thanks to Miss Rothmaler for her very helpful and substantial services, and to the Service Bureau of the Junior League of Brooklyn for their greatly appreciated cooperation.

Personnel

Mr. Daniel C. Downs, who became Secretary and Accountant on January 19, 1925, resigned as of July 31, 1939, after fourteen years and six months of service. During his incumbency the work of the office greatly increased in amount and diversity, and the work was facilitated by modern methods of office practice introduced from time to time by Mr. Downs.

Miss Maude E. Voris, Assistant Secretary in the Business Office since July 2, 1923, resigned as of June 31, 1939. Her intimate acquaintance with the history of persons and events during all these sixteen years made her services of special value.

The hearty good wishes of the Governing Committee and of the Botanic Garden Personnel go with both Mr. Downs and Miss Voris as they retire after these long years of service.

At a meeting of the Botanic Garden Governing Committee on June 16 the Director was requested to convey to Mr. Downs and Miss Voris the appreciation of the Committee for their long and faithful service and their devotion to the best interests of the Garden during a little over 14 years and six months, and 16 years of service respectively.

Mr. Thomas A. Donnelly succeeded Mr. Downs as Secretary and Accountant, beginning as of August 1, 1939. From April 17 to June 30, he served as Business Office Assistant, and during the month of July as Assistant Secretary, becoming Secretary and Accountant, in charge of the Business Office as of August 1, 1939. Mr. Donnelly came to us after thirteen years experience in the National City Bank of New York and its predecessors (Nassau National Bank and Bank of America, National Association), being head of the bookkeeping department for the past three years.

Miss Edna A. Palmitier succeeded Miss Voris as Assistant Secretary, in the Business Office, beginning as of July 1, 1939. She was previously in different departments of the National City Bank.

Mrs. Norma Stoffel Banta, who came to the Garden on February 28, 1928, as Business Office Assistant and Telephone Operator, resigned as of December 31, after eleven years and ten months of service.

Miss Jane E. Coffin was appointed Business Office Assistant and Telephone Operator, to become effective January 1, 1940, in place of Mrs. Banta, resigned. Miss Coffin volunteered her services without salary from December 11 to 31 in order to become familiar with the duties of the position.

FIG. 5. Gold Medal of the Horticultural Society of New York awarded to Montague Free at the Annual Flower Show Dinner, March 14, 1939. (9789)

Mr. Montague Free was awarded the Gold Medal of Achievement of the Horticultural Society of New York at the Annual Flower Show Dinner at the Waldorf-Astoria Hotel on March 14, in recognition of his twenty-five years of outstanding services to horticulture while at the Brooklyn Botanic Garden.

Miss Ellen Eddy Shaw was awarded the Silver Medal of the Federated Garden Clubs of New York State, March 14, at their Annual Luncheon at the Hotel Roosevelt, in appreciation of her twenty-five years of service in horticultural work with children at the Brooklyn Botanic Garden.

At the annual meeting of the American Nature Study Society in Columbus, Ohio, in December, Miss Shaw, who has served as president of the Society during 1939, was re-elected for another year.

FIG. 6. Silver Medal of The Federated Garden Clubs of New York State awarded to Ellen Eddy Shaw at their Annual Luncheon, March 14, 1939. (9807)

FINANCIAL

Change of Fiscal Year for New York City.—Beginning as of July 1, 1939, the Fiscal Year of the City of New York, which had previously coincided with the calendar year, was changed to begin as of July 1 and terminate as of June 30. In connection with this change, the Tax Budget appropriation for the first half of 1939 was determined in November 1937 with the adoption of the Budget for 1938, and was made almost exactly one-half the 1938 appropriation. The budget request for 1938 and the first half of 1939 was submitted in July 1937. Of course, it was difficult to anticipate requirements nearly eighteen months in advance, but the inconvenience was comparatively slight.

In the appended financial statement the appropriations and expenditures for the first half of 1939 are given separately (p. 108), followed by a similar report for the last half of the calendar year, which now becomes the first half of the fiscal year. As shown on page 111 of the financial statement, the total of available funds for the calendar year 1939 (and, for comparison, 1938) are as follows:

	1938	*1939*	*Change*
Tax Budget	$ 96,125.20	$ 93,597.28	$ 2,527.92 Dec.
Private Funds	123,694.89	100,664.14	23,030.75 Dec.
Totals	$219,820.09	$194,261.42	$25,558.67 Dec.

The percentages of the two budgets for the past eight years have been as follows:

	1932	*1933*	*1934*	*1935*	*1936*	*1937*	*1938*	*1939*
Tax Budget	50%	42.2%	49.2%	48.7%	49.1%	49.8%	43.73%	48.18%
Private Funds	50%	52.8%	50.8%	51.3%	50.9%	50.2%	56.27%	51.82%

The decrease in the Tax Budget represents decrease in appropriation; the decrease in Private Funds budget is chiefly accounted for by the contribution of $35,000.00 for the Dean C. Osborne Memorial in 1938.

The Tax Budget appropriation for the fiscal year beginning July 1, 1939, was $96,450.00, as follows:

	Requested	*Granted*	*Difference*
Personal Service	$ 93,089.20	$82,100.00	$10,989.20
Other Codes	19,412.05	14,350.00	5,062.05
Totals	$112,501.25	$96,450.00	$16,051.25

In the Tax Budget appropriation there was a decrease of $275.20 in salaries, and an increase in men-days for wages of $1,250.00, making a net increase in Personal Service of $974.80. In the codes for Other than Personal Service there was a total decrease of $650.00. For the entire budget there was a net increase of $324.80.

The increase for Wages enabled us to increase the rate for our per diem men by fifty cents a day. Even with this increase, the rate is still less than the rate prevailing in the Department of Parks and other City departments and, in all justice, should be brought up to the latter rate.

Capital Outlay Budget

Alterations, additions, and replacements to the heating system throughout the conservatories and Laboratory Building was under way from September 25, but the work had not been completed at the end of the year (Park Department contract number, 132,-460). The contractor for this work was the Jacobs Engineering Corporation, 103 Park Avenue, New York City, who was the lowest bidder. The amount of the appropriation was $8,280.

Replacement of the water supply system and plumbing repairs in the Conservatories and Laboratory Building (Park Department contract number, 132,292) was under way from July 31, and was completed November 22. The official contract time did not begin until August 31. The contractor for this work was Albert Miller, 62 Blake Avenue, Brooklyn, who was the lowest bidder. The amount of the appropriation was $5,222. The old iron water pipes were almost completely clogged up by deposits from the water. To avoid a repetition of this, they were replaced with brass pipes.

Both of the above contracts were under the general supervision of the Department of Parks.

Private Funds

In the preceding report I stressed the fact that during 1938 private citizens of Brooklyn contributed a total of more than $54,000 toward the work of the Garden, an amount equal to nearly 57 per cent. of the Tax Budget appropriation—a testimony to public interest in the Garden and confidence in its administration.

During 1939 Private Funds income, exclusive of interest on endowment, was $52,279.28—a total almost equal to that of 1938, and 54 per cent. of the 1939 Tax Budget appropriation. This is a substantial sum, considering the times—mounting taxes, myriads of good causes annually soliciting and meriting contributions, and diminished income, especially on invested funds.

But we must not lose sight of the fact that, while annual attendance and the demand of the public for service increase, our Private Funds Budget for 1939 ($100,664.14) is still $28,658 less than the Private Funds Budget of $129,322 just ten years ago (1929). It does not need any statement beyond the figures to emphasize what this falling off of more than 22 per cent. means in curtailment of activities, and how far we have to go on the road to recovery.

Endowment

The total amount of the principal of all endowment funds as of December 31, 1939, was $1,374,388.35, which represents an increase of $5,996.65 over the preceding year. The increases were

as follows: Endowment Increment Account, $3,206.15; Ellen Eddy Shaw Endowment Fund, $2,140.50; Herbarium Endowment Fund, $150.00; Life Membership Fund, $500.

To restore the loss of $28,658 in annual private funds income, indicated above, it would require the addition to our endowment of approximately $818,800.00 at 3.5 per cent. (the present average rate on invested funds). If the endowment principal were increased by one million dollars we should have only the modest additional annual income of $6,342 ($181,200 @ 3.5%) to provide for the enrichment and expansion of our services in harmony with the increased public demand and normal healthy expansion since 1929.

Bequests

Some of the readers of this Report may be contributors to the work of the Botanic Garden. Your contribution may be insured in perpetuity by making suitable provision in your will. By such a plan the work of the Garden is not crippled by the loss of its contributors. Forms of bequest are given on page iv preceding the main body of this report.

I cannot do better than close with the last paragraph from my preceding report:

"Said Professor William Graham Sumner, of Yale University, one of the founders of Sociology in America, 'Discontent . . . is an agency which produces achievement and drives on what we call progress.' We are appropriately discontented."

I cherish the fervent hope that this motivating discontent is felt, as it should be, by the trustees as well as by the executive.

Respectfully submitted,

C. Stuart Gager,
Director.

REPORTS ON RESEARCH FOR 1939

Plant Pathology

By George M. Reed

Studies on the Inheritance of Resistance of Oat Hybrids to Loose and Covered Smuts

Studies on the inheritance of smut resistance of oat hybrids were continued, many third generation progenies of different crosses being grown. Duplicate sets of seed for growing 145 third generation progenies of Green Mountain X Monarch were inoculated, one with Race 1 of the loose smut and the other with Race 3 of the covered smut, the latter originally obtained from France. The data indicate that inheritance of resistance to both of these smuts depends upon a single factor difference and, further, resistance to each smut is inherited independently. The variety Green Mountain is susceptible to the race of loose smut, while Monarch is resistant; in contrast, Green Mountain is resistant to the race of covered smut, while Monarch is susceptible.

In the same way, duplicate sets of seed for growing 265 third generation progenies of Navarro X Hull-less were inoculated with Races 1 of loose and covered smuts. Navarro is resistant to both races of smut, while Hull-less is susceptible. In this hybrid, the data indicate that the inheritance of resistance to loose smut depends upon two independent factors, while inheritance to the covered smut depends upon three such factors.

There were 165 third generation progenies of Navarro X Gothland inoculated with Race 1 of the loose smut. Gothland is susceptible to this smut, while Navarro is resistant. In this hybrid, the data indicate that the inheritance of resistance is dependent upon two independent factors, the results corresponding with the hybrid Navarro X Hull-less inoculated with the same race of loose smut.

Altogether, there were grown 151 third generation progenies of Navarro X Black Mesdag which had been inoculated with a highly specialized race of covered smut, to which Black Mesdag is susceptible and Navarro resistant. The data indicate that several factors for resistance are involved.

Physiologic Races of the Oat Smuts

The extensive data obtained over a period of several years were assembled in order to determine the possible number of physiologic races differentiated. In the course of the experiments, approximately 200 species and varieties of oats have been inoculated with many of the smut collections which were secured from widely separated regions. We are especially indebted to Mr. T. R. Stanton, Senior Agronomist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, Washington, D. C., who has supplied collections of smut from the important oat-growing regions of the United States. The problem has been to sift out the varieties of oats which were useful in separating possible races of smut. As the result of all the experiments, 29 distinct specialized races of loose smut have been demonstrated on the basis of their reaction on 17 varieties of oats. In the same way, 14 specialized races of covered smut of oats have been differentiated on 10 varieties. Most of these specialized races are based on a single collection. In a few cases, however, several collections of smut seem to be identical. It is possible that further tests with additional oat varieties might reveal one which would separate some of these other collections. A few races are capable of attacking a large number of oat varieties, while others appear to be quite narrowly limited in their capacity for infection. Of all the varieties of oats tested in the course of these experiments, only three have proved to be resistant to all of the races—Markton, Navarro, and Victoria.

Studies on the Methods of Inoculation of Oat Smuts

Early in our studies on the inheritance of smut resistance in oats, special methods for the successful infection of susceptible varieties were worked out. The method as finally used over a period of years consisted of (*a*) removing the hulls from the grain, (*b*) inoculating the kernels with dry smut spores, and (*c*) germinating the seed in sand with a low moisture content, at a temperature of approximately 20° C. This procedure, using a variety of oat susceptible to the particular strain of smut, has regularly given very high percentages of infection, in many ex-

FIG. 7. Portion of Experimental Greenhouse. Right Bench, Back Row, Pedigreed Seedlings for Disease Resistance Studies; Other Rows, Paper Cups and Pedigreed Seedlings. Center Bench, Oat Hybrids for Disease Resistance Studies; Left Bench, Hybrids and Parents of Southern United States Iris. (9950)

periments all of the inoculated plants having been smutted. The method has proved particularly valuable in connection with the studies on inheritance of smut resistance, since it was necessary to make as certain as possible that all susceptible individuals were infected. In oat smut investigations, other methods have been developed and, during the past year, comparative experiments have been carried out on some of these. In these experiments we have used several different races of smut, as well as a number of oat varieties resistant or susceptible to them. Our method, in practically every case, has given much better results than any other.

Studies on Experimentally Produced Physiologic Races of the Oat Smuts

Dr. L. Gordon Utter has continued his infection studies with collections of oat smut which resulted from hybridization between the loose and covered smuts of oats. In the previous report, a brief account of several selections, some of which may be new, distinct races of each smut, was given. The covered smut selections were characterized by their infection of Gothland, a variety normally resistant to this smut but susceptible to the loose smut. Similarly, the loose smut selections attacked Monarch, which ordinarily is only susceptible to the covered smut. Additional experiments were carried out with 34 collections of smut, obtained from various oat varieties, which had been infected with the different selections. The reaction of these collections on several varieties of oats was determined and, on the basis of their behavior, at least eight distinct races of covered smut and seven of the loose smut were differentiated. Gothland continued to be susceptible to the covered smut collections, whereas Monarch showed a range from full resistance to susceptibility. The loose smut collections gave high infections on Monarch but Gothland was resistant to some and susceptible to the others. In both smuts, certain collections showed identical behavior and, therefore, were considered as a single race, while other collections were so striking in their reactions that they were tentatively classed as distinct races. Several collections from three new races of each smut, when tested on various oat varieties, were generally found to give infections characteristic of the respective race. Several of the races also have

shown a remarkable uniformity in their capacity for infecting oat varieties over a period of years.

Sorghum Smut Investigations

Dr. D. Elizabeth Marcy continued investigations on the infection of sorghum varieties with the covered and loose kernel smuts. Studies were made comparing the growth rates of uninoculated sorghum varieties before emergence from the sand. The susceptible varieties were Dakota Amber Sorgo, Dawn Kafir, and Shallu, and the resistant varieties Feterita, Dwarf Yellow Milo and Darso. Marked differences were observed in the growth rate of the seedlings. These varieties also varied in height at maturity, and the rate of growth of the seedlings corresponded to their relative heights. There was no indication of a correlation between susceptibility and rate of growth of the seedlings.

The influence of several different environal factors was studied. Experiments were carried out on the effect of the size of sand particles, the amount of moisture, the influence of sucrose dissolved in water, and temperature. Seedling growth was found to be retarded by (1) maintenance of a low soil moisture (10 per cent. of the water-holding capacity); (2) moisture supplied as a 2 per cent. sucrose solution; (3) low temperature; (4) very fine sand; and (5) heavy tamping of the sand in which the seeds were germinated. The combination of these conditions which retarded seedling growth proved very favorable to high percentages of infection in susceptible varieties.

In other experiments, plants were stunted by removing part of the endosperm, with the purpose of determining whether this stunting would influence infection. In the series inoculated with the covered smut, a large number of the seedlings of the highly susceptible variety, Dakota Amber Sorgo, failed to survive. The amount of smut among those that did survive was less than for the non-stunted series. Since it is probable that those which died off were infected, no conclusions can be reached. Most of the plants of the somewhat less susceptible variety, Red Amber Sorgo, reached maturity, and the percentage of smutted plants was somewhat greater in the endosperm-deficient series. The experiment was repeated, inoculating the seeds with the loose smut. Again,

a large number of seedlings failed to survive and results from both these experiments must be considered inconclusive.

These various treatments influenced the percentage of infection in susceptible varieties, but had no effect whatever in bringing about the infection of resistant varieties, such as Dwarf Yellow Milo.

Field Assistants.—Miss Eleanor Shasken, who had completed her Junior year in Brooklyn College, and Mr. Benjamin Weinstock, who had completed his Junior year in Cornell University, spent part of their time in July and August in assisting in various phases of the experimental work.

The Iris

By George M. Reed

Studies on the hybridization of the iris which have been found in Florida and Louisiana have been continued. Several first generation plants of crosses have flowered, and their characteristics have been recorded. These plants have been self-pollinated in order to obtain a second generation series. A few second generation plants of certain crosses have flowered and shown various combinations of the characters of the two parental varieties. Many more may be expected to bloom during the coming year, thus giving a much larger number of plants for the study of range of variation. Miss Louise Mansfield made watercolors of the flowers of a few of the first and second generation plants, as well as the parental types.

Iris Thrips and Aphids

In cooperation with the Division of Truck Crop and Garden Insect Investigations, Bureau of Entomology and Plant Quarantine, Washington, D. C., further tests for the control of iris thrips were carried out by Dr. L. Gordon Utter and Dr. Floyd F. Smith. Derris powder (.02 per cent. rotenone) with sulphonated castor oil (1–400) as spreader, and 40 per cent. nicotine sulphate (1–450) with Grasselli-spreader-sticker, gave approximately 99 per cent. control when applied 8 times at weekly intervals during May and June, thus confirming previous results. Bi-weekly applications of

these sprays also proved highly effective. When the same sprays were applied 4 times at weekly intervals during the early part of the season, the control of thrips was not entirely satisfactory. Four applications of the same materials during June, however, gave excellent results. Sprays with reduced derris and nicotine content also gave promising control. Liquid extracts of pyrethrum (Pyrethrol 20), with the Grasselli-spreader-sticker, and derris (5 per cent. rotenone) were first tested during the year. The former gave good control, but below that of the standard derris and nicotine sprays, while the latter proved equally effective. It is proposed to carry out tests with nicotine, pyrethrum, and derris dusts during the coming year.

The southern United States iris plants growing in the greenhouse during the winter were heavily infested with the tulip aphids, and experiments were carried out in order to control them. Fumigations for one hour with calcium cyanide, used at the rate of 3 ounces to 1,500 cubic feet, gave fairly complete control. This concentration, however, is too high for some kinds of plants, although the iris seemed to be uninjured. Frequent spraying with 40 per cent. nicotine sulphate (1–400) and Grasselli-spreader-sticker (1–1,000) also gave marked reduction in the number of the aphids.

Soft Rot of the Iris Rhizome

Soft rot of the bearded iris continued to be destructive. The damage appeared somewhat later than last year, but toward the end of the summer large numbers of plants and some varieties had been completely destroyed. Treating the soil with bichloride of mercury, formalin, semesan, and ethyl mercury iodide during the preceding fall did not prevent the infection of the iris. Dipping the iris rhizomes in solutions of bichloride of mercury, formalin, potassium permanganate, carbolic acid, copper sulphate and semesan, or dusting with cupro jabonite, copper carbonate, and sulphur, before planting, proved ineffective. No difference in control was noted between such treated iris when planted in treated or non-treated soil.

Graduate Students and Independent Investigators Enrolled During 1939

Mr. Paul F. Brandwein has completed his studies for the degree of Doctor of Philosophy at New York University. He presented as his thesis "Infection studies on the covered smut of oats with special reference to the effective period of infection." His experiments were carried out over a period of years, and involved the detailed study of the behavior of large numbers of individual seedlings under the varied conditions of the experiments.

Mr. Bernard A. Friedman has continued his studies on the soft rot of Witloof chicory. He has isolated many cultures from diseased plants and made a careful comparison of their characteristics. Some Witloof chicory plants were grown during the past year for infection experiments.

Mr. Arthur Davidoff and Miss Jean P. Walther, graduate students in New York University, have enrolled for research in mycology and pathology.

Prof. Laura A. Kolk, Biology Department, Brooklyn College, has used some of our laboratory facilities for studies on the germination of several grass smuts collected in the vicinity of New York City.

Dr. Sylvia Colla, a graduate of the University of Turin, for several years has been engaged in the investigation of the value of chemicals in stimulating root production. Some of her investigations were carried on in Italy and others in the Argentine. During the past year she spent some time in our laboratory, carrying on further experiments along these lines.

Chestnut Breeding Work in 1939 *

By Arthur Harmount Graves

The object of this work is to develop, by breeding, a new chestnut tree of a type suitable for timber, which, at the same time, shall be practically immune to the blight caused by the fungus, *Endothia parasitica*. The reason for, and methods of this breeding have

* A more detailed account will be published in a forthcoming issue of the *Bulletin of the Torrey Botanical Club*.

been rather fully explained in my previous reports (e.g. *Brooklyn Bot. Gard. Record* 28: 55–56. 1939).

Assistance and Cooperation of Institutions and Individuals.—Popular interest in this problem increases each year. The Garden Club of America and the Connecticut Forest and Park Association, to mention only two of many organizations and individuals, have been particularly helpful with arrangements for securing additional land, on a cooperative basis. We acknowledge with pleasure the continued cooperation of the Division of Forest Pathology, U. S. Department of Agriculture, in sending us pollen and in giving us financial assistance for a part of the year. As already noted in our report of last year's work, the American Association for the Advancement of Science awarded us a grant-in-aid to be applied to the work in 1939.

On account of my absence in Europe during the flowering season of the chestnut, Miss Hester M. Rusk, Instructor in this department, was given entire charge of the hybridization work.

Summary of Hybridization Work in 1939.—During the summer, Miss Rusk, with the help of her assistants, made more than 60 different crosses on several hundred flowering branches of chestnut species, varieties, and hybrids. Resulting from this work, 767 hybrid nuts were harvested in October. All these nuts were planted in our cold frames at the Garden, and at Hamden. Ten new crosses were successfully made, bringing the total of new hybrid combinations of *Castanea* produced by the Garden to 36.

Pollen of the Chestnut was received toward the end of June and in early July from the following institutions or persons, and we take pleasure in making acknowledgment here.

June 18. From Division of Forest Pathology, U.S.D.A. *Castanea alnifolia.*

June 19. From T.V.A., Norris, Tenn., through Mr. J. C. McDaniel. *C. dentata.*

June 20. From Mrs. Louise Naylor, Little Silver, N. J. *C. crenata.*

June 21. From Mr. H. F. Stoke, Mountain Nut Co., Roanoke, Va. *C. dentata.*

June 26. From T.V.A., Norris, Tenn., through Mr. J. C. McDaniel. *C. neglecta* (= *C. pumila* × *C. dentata*).
July 1. From Division of Forest Pathology, U.S.D.A., through Mr. R. B. Clapper. *C. dentata.*
July 12. From Mr. Alfred J. Frueh, West Cornwall, Conn. *C. dentata.*

Stoke Hybrids.—On March 3 we received scions of valuable hybrid chestnut stock from Mr. H. F. Stoke, of the Mountain Nut Company, Roanoke, Va. These were grafted on some of our Chinese and Japanese seedlings on April 15, with the result that we now have 12 trees of these hybrids.

Cooperative Plantings.—In 1939 we continued to extend our cooperative plantations (explained in my report for 1938, p. 57), and accordingly supplied seedlings to Dr. D. F. Jones of the Connecticut Agricultural Experiment Station at New Haven, Conn., for planting out on the experimental farm of the Station, located at Mt. Carmel (Hamden), Conn. The trees now growing in the three cooperative plantations are as follows:

Cooperative Plantation No. 1

On Farm of Dr. W. W. Herrick, Sharon, Conn.

Seedlings in first year of growth: from nuts harvested in 1938

C. crenata × *C. dentata*	2
C. crenata × (*C. crenata* × *C. dentata*)	10
(*C. crenata* × *C. dentata*) × *C. crenata*	3
(*C. crenata* × *C. dentata*) × (*C. crenata* × *C. dentata*)	8
C. mollissima × *C. dentata*	2
C. mollissima × (*C. crenata* × *C. dentata*)	14
C. Seguinii × *C. crenata*	1
S8 × *C. dentata*	4
S8 × *C. mollissima*	6
S8 (from open pollination) 2 years old	75
Total	125

Cooperative Plantation No. 2

On Grounds of New Haven Water Company, Orange, Conn.

All seedlings in first year of growth: from nuts harvested in 1938

Seedlings from open pollinations

C. crenata × *C. dentata*	119

Seedlings from controlled pollinations

C. crenata × (*C. crenata* × *C. dentata*)	6
C. Seguinii × *C. mollissima*	3
C. mollissima × (*C. crenata* × *C. dentata*)	1
Total	129

Cooperative Plantation No. 3

On Farm of Connecticut Agricultural Experiment Station; Mt. Carmel (Hamden), Conn.

All seedlings in first year of growth: from nuts harvested in 1938

C. mollissima × *C. crenata*	3
C. mollissima × (*C. crenata* × *C. dentata*)	3
C. crenata × *C. mollissima*	3
C. crenata × *C. dentata*	7
Total	16

Nuts Received in 1939, With a List of Donors

The following people sent us nuts in the fall of 1939, which have all been planted (except in a few cases, where they contained no embryos) in our cold frames at the Garden.

Sept. 23. *Castanea dentata* from Dr. W. W. Herrick, Sharon, Conn.

Sept. 23. *C. dentata* from Mr. Emanuel Gerstein, Elmont, Long Island, N. Y.

Sept. 26. *C. dentata* from Dr. W. C. Deming, Litchfield, Conn.

Sept. 27. *C. dentata* from Dr. W. W. Herrick, Sharon, Conn.

Oct. 3. *C. dentata* from Mr. and Mrs. K. F. Milde, Litchfield, Conn.

Oct. 3. *C. dentata* from Mr. Edward T. Mish, from Green Haven, Dutchess Co., N. Y.

Oct. 5. *C. mollissima* from Dr. George L. Buist, Brooklyn, from trees growing at Sparta, N. J.

Oct. 10. *C. dentata* from Mr. John Colin, Millhurst, N. J., through Mr. J. H. Schmidt, New York, N. Y.

Oct. 10. *C. dentata* from Mr. Joseph Zuccaro, Staten Island, N. Y.

Oct. 13. *C. dentata* from farm of Mr. M. J. Stowell, North Coventry, Conn., through Mr. Floyd M. Callward, Storrs, Conn.

Oct. 13. *C. dentata* from Miss Madeline Haenny, Washington, D. C., from trees growing at Shenandoah National Pk., Virginia.

Oct. 14. *C. dentata* from Taylor Brothers & Cox, through Mr. F. A. Taylor, from trees of Mrs. J. A. Nichols, Old Conn. Path, Wayland, Mass.

Oct. 14. *C. mollissima* from Dr. W. C. Deming, from trees growing at Litchfield Center, Conn.

Oct. 14. *C. dentata* from Dr. W. C. Deming, from wild trees in Conn.

Oct. 15. *C. dentata* from Mr. W. E. Benua, Columbus, Ohio.

Oct. 21. *C. dentata* from Mr. H. D. Tiemann, Forest Products Laboratory, Madison, Wisconsin, from trees growing at Wisconsin Dells, Adams County, Wis.

Oct. 27. *C. dentata* from Miss Ruth Erickson, New Milford, Conn.

Oct. 31. *C. dentata* from Mr. P. H. Smith, Pawling, N. Y., from trees growing at Sherman, Conn.

Nov. 3. *C. dentata* from Mr. Howard Babyok, Holyoke, Mass.

Nov. 9. *C. crenata* from Dr. John Brinkmann, Echo Farm, Greenlawn, Suffolk Co., L. I., through Mr. Harold Willmott, Huntington, L. I.

Nov. 21. *C. crenata* from Dr. Charles J. Schlesinger, Monroe, N. Y.

Dec. 21. *C. dentata* from Mr. H. Mason, Farmingdale, L. I.

Inventory of Trees on the Hamden Plantation.—We now have 729 seedling hybrids resulting from controlled pollinations and having 39 different pedigrees; also 12 grafted hybrids, and 384

other trees distributed among eleven species of chestnut, all these growing on our plantations at Hamden, Conn. These, together with the seedlings from open pollinations, make a total of 1,930 trees. If those of the cooperative plantations are added, the total number is approximately 2,200.

Systematic Botany

The Classification of Dicotyledons

By Alfred Gundersen

Studies of flower structures, with drawings by Miss Maud H. Purdy, have been continued. An article on "Flower Buds and Phylogeny of Dicotyledons," published in the spring, summarizes these studies. Afterwards a brief outline of applications to classification was published, together with the diagram which is reproduced on the opposite page. This arrangement may be briefly compared with earlier systems of dicotyledons:

(1) It agrees with the Hallier, the Bessey, and the Hutchinson systems in beginning with dicotyledons having separate carpels, in this respect differing from the Engler and the Wettstein systems.

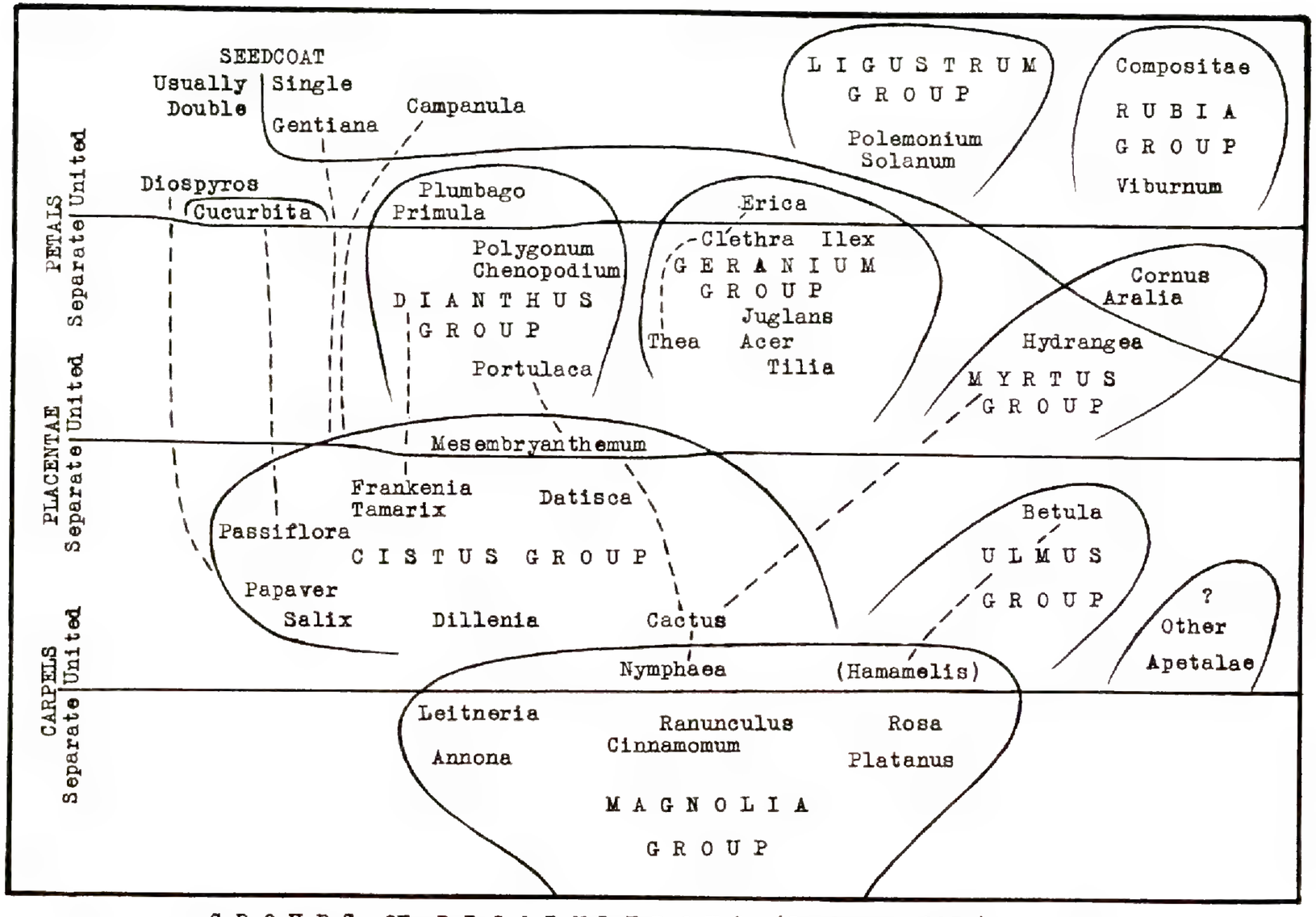
(2) Catkin-bearing groups are placed not at the beginning, but near the beginning, as suggested by their abundance among cretaceous fossils.

(3) It agrees with the Bentham-Hooker, Bessey, Hutchinson, Warming, Wettstein, and Rendle systems in placing the *Papaver* and *Cistus* groups of families (*Rhoeadales* and *Parietales*) near each other. In the separation of these groups the Engler system stands alone, and this separation must be considered a mistake.

(4) It agrees with the Wettstein and the Warming systems, and with the suggestions by Schumann and by Engler, that *Cactus* and *Mesembryanthemum* are related.

(5) It adopts the principle that parietal placentation in phylogeny, as in ontogeny, precedes axile placentation. These facts of development were shown by Payer in his illustrations eighty years ago, though not explained in his text.

(6) It agrees with the Bentham-Hooker and earlier systems in placing *Caryophyllaceae* near *Frankeniaceae*. Thereby a natural



G R O U P S O F D I C O T Y L E D O N S (Gundersen 1939)

FIG. 8. Placentation and Classification in the Dicotyledons. (9984)

connection is suggested for *Caryophyllaceae, Chenopodiaceae* and other herbaceous apetalous dicotyledons.

(7) While Hutchinson's separation of Dicotyledons into two groups, woody and herbaceous, is not followed, in a number of other respects the Hutchinson system is accepted.

(8) A large part of the Sympetalae are maintained as in the Engler system, but their multiple origin is indicated, approximately as suggested by Wernham.

Systematic botanists for practical purposes favor the maintenance of classification of large groups to which they are accustomed. "Most systematists who are occupied with plant species, genera or families, floristically or by monographs, are also today in the first place diagnosticians," writes Hubert Winkler in a recent article, "they encounter phylogenetic problems either not at all or only within the groups under consideration."

Herbarium Research and Field Work

By Henry K. Svenson

Eleocharis

The extensive paper on the sedge genus *Eleocharis* which was completed in 1939 and published as Brooklyn Botanic Garden Contributions No. 85 included a resumé, indexes, and maps and illustrations by Miss Purdy for approximately 150 species distributed throughout the world, and it is particularly interesting as being one of the few botanical treatments of world-wide scope carried out in this country. Since the great concentration of this group of sedges is in the tropical and temperate regions of America, such a work could probably not have been carried out to approximate completion by a worker in the Old World, where only small representations of American plants are available; on the other hand, since the majority of American species were described on the basis of fragments received in Europe in the eighteenth and nineteenth centuries, recourse has been necessary to nearly all of the large European institutions where specimens are preserved which are the foundation of present-day names.

Interest in the world-wide distribution of *Eleocharis,* as men-

tioned in my annual report of 1938, has brought the Brooklyn Botanic Garden into close contact with practically all the universities and other botanical institutions in this country and with nearly all the large museums of Europe and even of the Orient; the group is of some economic importance, and material is constantly being sent in for identification. In this relationship we are especially indebted to Dr. S. T. Blake, of the University of Brisbane, Australia, for his generous contribution of specimens and notes. *Eleocharis,* curiously enough, outside of the American continent is best developed in Australia.

During the past year the research program has consisted of two large projects: (1) a continuation of the study of the sedges, including the smaller genera *Bulbostylis, Fimbristylis,* and *Fuirena,* groups which have been puzzling to all workers on the flora of temperate and especially tropical America. These sedges differ from *Eleocharis* in being leafy-stemmed. It is expected that the treatments of these genera (now approaching completion) will bring about simplification of the present-day chaos as regards the identity of species.

Flora of Tennessee

(2) Work was continued on the plants of Middle Tennessee, an area which is undergoing very rapid changes, since it is now the center of TVA activities. It is also a center of dispersal of the flora of the Appalachian highlands and contains a surprisingly large percentage of the species which are found in the New Jersey pine barrens, some of the species, for example *Iris prismatica,* being of very rare occurrence in the territory between the New Jersey pine barrens and the oak barrens of Middle Tennessee. During the month of April extensive material was collected for study and for exchange with other botanical centers, chiefly in the area lying just to the westward of the Cumberland Plateau and extending north from the Alabama line. These collections include plants of early spring and an adequate representation of the native early azalea or honeysuckle, *Rhododendron canescens.* Headquarters were established at Huntland, Tennessee, through the kindness of Mr. L. L. Gore of Nashville. It is expected that a detailed report of the vegetation will be published sometime during the coming year in cooperation with Prof. Jesse M. Shaver of Nash-

ville and the Tennessee Academy of Science. Cooperation with Dr. H. M. Jennison, botanist for the Great Smoky Mountains National Park, is unfortunately over; the sad news of his sudden death was received in the early days of 1940, and the South loses in him one of its most inspiring leaders in natural history.

Part of the month of July and the month of August were spent in the vicinity of Nashville, where collections were made in the rugged areas between Nashville and the Tennessee River.

Genetics

Experimental Variation in Nephrolepis

By Ralph C. Benedict

In the field of plant and animal variation, the fern genus *Nephrolepis* is conspicuous as an example of rapid and extensive evolution of new types for which exact observational data are available. Noted first about forty years ago in the greenhouses of commercial growers, hundreds of horticultural varieties came into being through a period of about twenty years both in this country and in Europe. The Brooklyn Botanic Garden's study of these variations was begun toward the end of the period of the greatest horticultural interest in these plants. During the prosecution of research over four hundred accessions were brought to the Botanic Garden for cultural study from various parts of this country and from Europe, and numerous visits were made to florist establishments in this country with the aid of grants from the American Association for the Advancement of Science.

As a result of these studies, a number of research papers were published, which were issued as Brooklyn Botanic Garden *Contributions,* and other papers were published in connection with the horticultural journals.

In the second phase of this study of *Nephrolepis* variation, a large number of new types were obtained in connection with the Botanic Garden cultural work. The study of these formed the basis of further research reports. When these studies were going on, from time to time, requests came in for representative collections. These forms were for college teaching purposes. Similar use has been made in connection with high school biology here in New York City.

The collection has been maintained in much diminished size during recent years. It is still, however, well representative of the variation of this fern genus, and constitutes a collection which could not be duplicated in any institution.

Colchicine Experiments

These *Nephrolepis* variations present many unsolved research problems, in comparative anatomy and cytology, for example. During the past two years one specific line of research was prosecuted at the suggestion of and with the help of Dr. A. F. Blakeslee, of the Station for Experimental Evolution at Cold Spring Harbor, Long Island; namely, the possibility of inducing variation through colchicine treatment. Two lines of experiment with colchicine were carried on here at the Botanic Garden. Vegetative parts of the plants, particularly the stolons, were immersed in colchicine solutions of different strength, following the procedure successfully carried out at Cold Spring Harbor with flowering plants. The results, at first promising of positive variation, were finally negative. The fern tissues became considerably swollen but did not reproduce new plants, and histological examination by Dr. Satina, at Cold Spring Harbor, indicated that the swelling was pathological. In a second series of experiments, carried on at Brooklyn College with the help of Miss Theresa Rosenberg, fern spores were treated with colchicine and their germination watched. Germination of the spores was obtained, and prothallia consisting of a very few large cells resulted, but no later stages developed. The enlarged cell size is one of the indicia of positive colchicine results, but, so far, none of the treated material has lived long enough for any certain determination.

Fern Families and Species

The fern collections of the Botanic Garden over a period of twenty-five years have been given some recognition not only for special study in variation in *Nephrolepis,* but also as a general representative collection of significant fern families and species, and in relation to the horticultural use of ferns. At the present time, the general fern collection, small as it is in comparison with some of the earlier greenhouse collections in this country and Europe,

is probably one of the most representative collections of living fern plants. This is due to the fact that efforts have been made constantly to obtain as large a selection of different fern families and ecological types as possible, and to maintain these collections for their general botanical and special research value. At the present time, the collection includes most of the very diverse, but interesting, aquatic fern families and genera. Among the species of ordinary soil culture type, we still have a wide range of the forms which are used, or have been used, in the horticultural trade. For these and other reasons, the contribution which the Botanic Garden can make in maintaining the general collection of living ferns is emphasized. There is no other like it in New York City.

Economic Plants

By Ralph H. Cheney

1. Further study of the taxonomy and flavor qualities of the Mints was continued. Additional herbarium specimens and photographs were obtained.

2. Histo-physiological studies of the effects of the plant purines, especially caffeine, upon the microstructure of striated muscle under excitation, were extended during the summer at the Marine Biological Laboratory, Woods Hole, Massachusetts.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1939

To the Director:

I present herewith the report of the work of this department for the year 1939.

Attendance

Grounds.—The total attendance on the grounds was the largest in the Garden's history—1,798,029, as against 1,726,119 of last year. This, in spite of the prophecy, voiced by certain experts in the early part of the year, that the competitive influence of the World's Fair, in the Flushing Meadows, would reduce the attendance at metropolitan institutions. However, such cause and effect may have actually been the case, for our annual increase has often been more than the 4 per cent. (approximately) shown this year.

Monthly Attendance.—Four individual months showed record attendances, as follows:

1939	*Attendance*	*Largest Previous Attendance*	*Year*
January	91,019	72,370	1933
February	86,925	79,825	1937
June	193,902	184,869	1938
July	195,838	169,147	1935

Conservatories.—For the last quarter of the year the conservatories were closed to the public because of necessary repairs in the heating system. Even so, the attendance for the nine months (122,942) is creditable—an average of more than 13,000 for each of the nine months. The attendance for the month of April (35,394) was a record, the largest previous figure being that of April, 1938—30,572. The present record averages considerably more than 1,000 people a day.

Classes and Lectures.—The combined attendance at classes and lectures was 104,312, a considerable increase over that of last year —72,294. Other attendance data may be seen in the subjoined table.

ATTENDANCE AT THE GARDEN DURING 1939

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes	1,332	1,256	2,481	2,183	2,620	2,251	2,216
At visiting classes	2,131	2,149	5,404	5,029	21,784	9,188	637
At lectures to children	1,131	882	1,620	2,953	13,782	4,405	24
At lectures to adults	18	654	0	453	290	0	36
At conservatories	7,089	9,178	6,906	35,394	24,190	9,982	11,417
At grounds	91,019	86,925	97,243	211,770	336,290	193,902	195,838

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
At regular classes	2,216	195	1,541	2,722	3,029	24,042
At visiting classes	400	40	6,883	24,488	2,137	80,270
At lectures to children	30	0	5,866	10,609	1,765	43,067
At lectures to adults	0	35	705	0	75	2,266
At conservatories	9,222	9,564	0	0	0	122,942
At grounds	149,006	150,752	131,359	109,197	44,728	1,798,029

Statistics of School Service

	1938	1939
Loan Lectures (Lantern Slides, etc.)		
No. of sets lent	24	38
No. of teachers involved	66	169
No. of pupils attending	5,249	12,647
Material Supplied		
Total number of requests from schools	540	655
Number of different institutions	168	202
High Schools and High School Annexes		
Brooklyn (Total No. 41)	23	24
Queens (Total No. 23)	9	9
Manhattan (Total No. 32)	13	14
Other Boroughs (Total No. 25)	8	11
Junior High Schools (Total in Brooklyn 25)	8	12
Colleges and Universities (Total in Brooklyn 7)	8	11
Elementary Schools		
Brooklyn (Total No. 240)	61	70
Queens (Total No. 145)	1	8
Manhattan (Total No. 127)	1	3
Other Boroughs (Total No. 149)	5	7
Private and Parochial Schools	16	15
Other Institutions	15	18
Number of potted plants for nature study	2,259	2,115
Number of Petri dishes filled with sterilized agar	1,599	1,002
Total number of teachers supplied with material	2,888	4,742
Total number of pupils reached	159,441	281,729
Living Plants Placed in School Rooms		
No. of schools	28	64
No. of plants	334	1,065
No. of teachers involved	567	2,082
No. of pupils reached	24,171	83,915
Plants Distributed (Raised in Classes)	41,846	36,038
No. of persons taking plants	1,643	1,394
Total number of schools represented	142	150
Seed Packets for Children		
No. of schools	513	569
No. of teachers	7,765	7,982
No. of pupils	310,662	319,343
No. of packets	931,724	958,028
Exhibits Provided		
No. of exhibits	4	9
Viewed by	130,400	110,620

Adult Courses

"Trips to the Tropics" is the title of a new course that was given for the first time in January, 1939. It consisted of four guided tours through the conservatories on Saturday afternoons, with special emphasis on some particular subject; as, food and beverage plants; desert plants; orchids, etc. Twenty-four people registered for these trips, which were conducted by Miss Vilkomerson and myself.

Trees and Shrubs of Greater New York.—Given, as usual, on twenty Saturday afternoons in the spring and fall, by Miss Vilkomerson and myself, with a total registration of 48—23 in the spring and 25 in the fall.

Medicinal Plants and General Botany in Relation to Medicine.—220 young women, 70 in the spring and 150 in the fall, came for this course from three hospitals: Kings County, Prospect Heights, and St. Johns. The 150 in the fall were divided into three sections of 50 each, coming on Tuesday and Wednesday mornings and Thursday afternoons. Each division of 50 was again divided into two parts of 25 each. One part studied the plants on the grounds and was in charge of Miss Rusk or myself, while the other part was busy in the Laboratory Building working with microscopes, under the direction of Miss Vilkomerson. The spring class of 70 I divided into two sections of 35 each, both of which I taught alone. These courses are given for the hospitals entirely without charge.

Walks and Talks.—Forty-four persons registered for this course, which is described in my report of last year. But the attendance varied from 4 to 30, dependent, apparently, on weather conditions. No fee was charged for the course.

General Botany (B1).—Begun in the previous fall (1938) by Miss Rusk, this course was continued until June.

Flowering Plants: Field and Laboratory Studies.—Miss Rusk continued, during the first half of the year, with the laboratory class in flowering plants begun the previous year (B10). During the spring she conducted field and laboratory classes (A11 and B10) on flowering plants (all day Saturdays), and in the fall commenced another laboratory course (B10) on flowering plants, as well as a field class (A13) on fall wild flowers and ferns.

Total Adult Registration.—The total number of persons registered in adult courses at the Garden during the year 1939 was 725, as against 761 in 1938.

Flower Days

Two Flower Days were observed in 1939, as follows: Tuesday, June 13. Twelfth Annual Rose Garden Day. *Speaker:* Mr. Montague Free, Horticulturist. *Topic:* Modern Trends in Rose Growing. Thursday, October 5. Fall Rose Garden Day. *Speaker:* Mr. Montague Free. *Topic:* Making the Brooklyn Botanic Garden Rose Garden.

The latter event was held in conjunction with the annual meeting of the American Rose Society, which occurred on October 5 and 6. Members of the Garden and their friends were invited to join the members of the Society for events occurring Thursday morning at the St. George Hotel. Mr. S. R. Tilley, Rosarian of the Brooklyn Botanic Garden, was one of the speakers at this morning program. In the afternoon, members of the Society attended the Rose Garden Day exercises at the Brooklyn Botanic Garden. An exhibit of cut roses, named varieties, under the auspices of the Rose Society, was shown at the Brooklyn Botanic Garden. Tea was served in the Rotunda by the Woman's Auxiliary of the Garden.

Publicity

As usual, at intervals of from one to three weeks, we mailed to the principal metropolitan dailies, horticultural magazines, and other publications, news releases telling of events at the Garden. These releases contained 38 articles, totalling 59 pages of folio letterhead size. A total of 954 clippings was received from various sources, as against 1,079 in 1938.

We prepared and mailed to members of the Garden two schedules of broadcasts given by members of the Garden personnel; the first, listing those from January to June, and the second, from July to December. Copies of these schedules were enclosed, for the purpose of publicity, in many of the ordinary routine letters mailed by members of the staff.

Circulars describing our courses were prepared, printed and

mailed in the spring, and again in the early fall. These circulars were also enclosed in routine correspondence. Other courses, occurring at extra-seasonal times, were announced through news releases, post cards, or special printed circulars.

The annual *Prospectus,* containing an account of all our courses, lectures, and other educational features, was prepared and issued in early September, as number 3 of the *Brooklyn Botanic Garden Record.*

Schedules of regular and of visiting classes, and other appointments, were mimeographed each week throughout the school year, and distributed to members of the staff.

Appropriate material was placed on the bulletin boards on the grounds, and changed from time to time.

I prepared and mailed copy for an advertisement of our spring courses, featuring a certain course, to one of our metropolitan newspapers for insertion in its special "Flower Show" issue. From subsequent inquiry I found that the unusually large registration in the course featured, more than defrayed the cost of the advertisement. And many people who did not register for the course must have seen the ad. Among the responses, we received a request for the circular from a person in Rio de Janeiro!

Personal Activities of Members of the Department

From June 24 to August 3, while I was absent in England, Miss Rusk had charge of the summer work on our chestnut plantation, at Hamden, Conn. During this time, however, she spent a week at Rogers Rock, Lake George, N. Y., where she was chief lecturer and field trip leader at the Third Annual Summer Garden Institute. During that week she gave 4 lectures, illustrated by fresh and dried plants, and led 5 field trips in neighboring woods, fields, and bog. During the year, as usual, at the Garden, Miss Rusk had charge of the preparation of monthly, quarterly, and annual statistical reports of this department, as well as the combination of these reports with those of other departments. Until about the middle of July she was assisted by Miss Rae Vogel of the W.P.A. For a few weeks at the end of the year she was assisted by Miss Frieda Taub of the W.P.A. For about two months at the end of the year she had the voluntary assistance of Mrs. Herbert Lawrence for several days a week.

Miss Rusk continued to serve on the Local Flora Committee of the Torrey Botanical Club, and also as Librarian of the American Fern Society.

On June 24 I sailed for England, in order to visit again the principal botanic gardens there and in Scotland, and at the same time to study specimens of the chestnut (*Castanea*) in various herbaria. I wanted to see also the living specimens of this genus, in the botanic gardens and elsewhere. Several days were spent at the herbaria of the Natural History Museum at South Kensington, London, of the Oxford Botanic Garden, and of the Edinburgh Botanic Garden. The botanic gardens of Chelsea (London), Kew, Oxford, Cambridge, Glasgow, and Edinburgh were visited. On August 23 I returned to the Brooklyn Botanic Garden.

On January 3 I was elected president of the Torrey Botanical Club, the oldest botanical society in America, an organization of more than 500 members, who represent most of the states of the Union and many foreign countries. I have presided at most of the meetings of the Club and its Council, throughout the year.

I continued to serve as Editor of the Plant Section of General Biology for *Biological Abstracts,* and, as usual, had general supervision of the publishing of the *Contributions* of the Garden.

Miscellaneous Items

The School Art League of New York City, Miss Margaret L. Murphy, Teacher-in-Charge, met in the auditorium of the Laboratory Building on February 25. The attendance was 606.

Twelve "Exhibit of the Week" Bulletins were installed at various points in the plantations during 1939. This feature was, as usual, in charge of Miss Hilda Vilkomerson. It is described in detail in my report for 1937.

Woods for Yale Collection.—Two comparatively rare kinds of wood—that of Smoke Tree (*Rhus Cotinus*) and of the Persian Lilac (*Syringa persica*)—were sent to Professor Samuel J. Record of the Yale School of Forestry, to add to the collection there.

Branchville Nature Conference.—On May 19–21, I attended the Branchville Nature Conference at the " Pines," Branchville, N. J. I attended some of the field trips and led one, besides, as President of the Torrey Botanical Club, addressing one of the evening meetings.

Bureau of Information.—With the hearty cooperation of other members of the Garden personnel, particularly of the Library staff, we have answered a large number of letters and telephone inquiries, requesting information on a great variety of subjects.

Post cards to Members were sent on March 30 telling about the crocuses in bloom at the Garden; on May 23 announcing the distribution of propagative material of chrysanthemums; and on November 3, telling of the beautiful coloring of the Euonymus hedge in the Laboratory Plaza and of the Chrysanthemums in bloom.

Bird Lists.—With the continued cooperation of Mr. Bernard P. Brennan, and others, of the Brooklyn Bird Lovers Club, we have posted lists of birds seen in the Garden from week to week, beginning January 1, and ending in October. These lists have been posted on the bulletin boards of the Garden and have aroused much interest.

Demonstration of Grafting.—On May 8 the teachers in the Biology Department of Grover Cleveland High School came to the Garden for a lecture on and a demonstration of various methods of grafting. The demonstration was made by Mr. Joe Bass, one of our gardeners.

Visits of High School Classes.—Classes from various high schools visited the Garden during the year in charge of members of this department. One of them, consisting of the biology department and classes of the Abraham Lincoln High School—about 300 persons in all—visited the Garden on Saturday morning, May 27. Each pupil was handed a question sheet to be answered during his trip around the Garden. Toward the end of the morning the classes assembled in the auditorium of the Laboratory Building, where they were given a talk on forestry and plant conservation.

Leaflets.—We still receive many requests for the *Leaflets* that have been issued in past years, beginning in 1913, but now, for financial reasons, discontinued, except for three or four numbers a year in connection with the International Flower Show and other special occasions. Their regular publication should be resumed as soon as funds become available for that purpose.

Docentry.—The guidance of individuals, garden clubs, and other

parties around the grounds and conservatories, with a peripatetic lecture about the various plants and features, is a function of this department which consumes a large amount of time, especially during the busy months of April, May, June, September, and October. It would help a great deal if we had a person on part time to whom this work could be delegated.

Research.—As much time as could be spared from my other work was devoted to research, a brief report of which will be found on pages 58–63.

Respectfully submitted,

ARTHUR HARMOUNT GRAVES,
Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1939

TO THE DIRECTOR:

I hereby present my annual report for the Department of Elementary Instruction for the year 1939.

In my vacation period I visited gardens in Great Britain and continued a piece of educational work started some years ago. I inspected gardens in London and vicinity, such as those at the School of Horticulture at Swanley, Lord Northbourne's, and many smaller ones; also the Botanic Gardens at Edinburgh and Dublin, besides private gardens in Devon and Cornwall. One lecture was given at Swanley to a group of teachers from Kent. It was one of a series called the "Refresher Lectures" for teachers to inspire and refresh their minds. These were all elementary teachers, mostly men, who were concerned with the school gardens of Kent.

Each year some lectures of far-reaching importance are given by this Department. In 1939 Miss Miner spoke before the Garden Club Federation of Maine, at Portland; to the Garden Club of Ohio, at Cleveland; and at the Sixth Annual Outdoor Recreation Congress, at Massachusetts State College in Amherst. Such lectures as these are on the subject of "Children's Gardening" based on our work here at the Brooklyn Botanic Garden, and have become the basis for work in many places throughout the country.

The high spots of the year are as follows:

The work for visiting classes showed a large increase, the attendance for 1939 being over 80,000, against approximately 40,000 for 1938. This increase may be accounted for largely through the work of the W.P.A. Excursion Teachers. The Department of Elementary Instruction, during the months of March and April, met this group of teachers-in-training and prepared them for their work with visiting classes at the Brooklyn Botanic Garden. During the month of December also, a similar piece of work was carried on in cooperation with the Brooklyn Museum's Department of Education. Nine W.P.A. teachers of college standing were trained to assist with classes sent by the schools to both the Museum and the Botanic Garden. The work will be carried on with the same group during the spring of 1940. This adds considerable to the work of the Department, but in figures, at least, it justifies the time spent.

Other branches of our work show figures similar to those of last year, and appear in the tables and figures of the report of the Curator of Public Instruction.

Our instruction greenhouses, which showed an attendance of about 5,000 people for work, have been much overcrowded for many years, and in 1939 a much-needed addition was built between the greenhouses. The roof is made of slatted wood sashes which in the spring will be replaced by glass sashes. These make it of value through the year. The bulbs through the winter find their home under the benches. In this addition, in the spring, seedlings have a proper place for hardening off; in the summer, house plants may be taken from the instruction greenhouses and stored there. The need of this structure is evident from these figures. During the past year, the number of plants raised in our classes (both those for adults and for children) was 36,000.

Attendance in Children's Saturday Classes was over 17,000. During the months of January and February high school students had a special course in hydroponics given by Miss Dorward. The experiment really covered a period of six months, allowing time for observation of the plants raised in nutrient solutions. During these winter months Miss Carroll gave special instructions in art in its relation to botany.

The Children's Garden carried on its usual summer program much interfered with by drought. Registration for the summer was 277. An astonishingly fine crop was raised in spite of the dry weather. Certain figures may here be of interest, such as 1 ton of tomatoes (nearly twice the crop of the past few years); 15,000 radishes; 8,000 carrots; 6,000 beets. While these are mere figures, they do tell something of the work done by these boys and girls. The Children's Garden was used more this year for outside groups than has been done for a great many years. The Girl Scouts received instruction once a week and had a demonstration plot in the area. The Garden Club of Public School 9, which worked here once a week in after-school time throughout the school year, learned to plant an annual border, had lessons in cultivation in the perennial border, and in how to cut grass and take weeds from the lawn. This group contributed a great deal to the work of the garden. Public School 183 sent a class for practical lessons in soil preparation and planting. They also helped in the planting of the border and had practice in the use of tools and the planting of seed. This group demonstrated in their own garden the lessons they had learned at the Brooklyn Botanic Garden. Our Children's Garden was visited by the Ridgefield Park (N. J.) Girl Scouts to see the work of the Brooklyn Girl Scouts. Miss Mackey, of the Brooklyn, Plant, Flower and Fruit Guild, asked the children to donate bouquets for school lunchrooms that were to be open in the summer under the W.P.A. supervision. For five weeks bouquets were presented for this purpose.

A small waterproof label for the Shakespeare Garden was tried out this summer with considerable success. It was lettered and prepared by Miss Carroll.

In September winter rye was planted in the Children's Garden, to be plowed in this next spring. This was planted in the hope that not only will some food content be added to the soil, but also that the water-holding capacity may be increased.

At Christmas time the boys and girls presented from their pennies saved last summer, the sum of $50 to defray the expenses of publishing the Children's Map of the Garden which was finished in December, 1938.

As usual, material for plant study and general nature study was distributed to the schools by request. In this way nearly 200,000 children benefitted, and some 4,000 teachers. Much of this material is planned for and collected during the summer by Miss Hammond who has a month given her for the purpose of gathering, mounting, and arranging material for this part of the work.

During the spring of 1939 Miss Hammond gave a course in Nature Study for Camp Counselors at the request of the American Institute of the City of New York, as part of their Workshop Courses. Seventeen young people registered for the course, some of whom came from New Jersey and as far out on Long Island as Rockville Centre.

In March, a course on School and Home Gardening was planned and inaugurated for teachers of the City by Mr. Marvin M. Brooks, Director of School Garden and Nature Work for the Board of Education, and given by him and Miss Miner at the Brooklyn Botanic Garden.

The Department and the Botanic Garden are both indebted to Miss Carroll, Instructor in this Department, for work done in her own time, such as the design for the cover of the folder of Spring Courses; for assistance to Dr. Gager on the brochure issued by the Garden in the spring; for the special paintings of our display at the World's Fair, and the design for a Japanese frame to hold a painting used at the iris display at the Fair. Legends for the film of the Garden and the Children's Work were also designed and lettered by Miss Carroll.

During the last summer Miss Carroll gave a course at Blue Ridge College, N. C., under the heading of "The Relation of Plant Life to Art," as she has done for the past two years. She has also been made a member of the Committee of Directors of the Conference.

In the fall Mrs. Adelaide Derringer was sent by the new Department of Public Recreation of the City of Baltimore (which began functioning January 1, 1939) to study our methods in children's gardening, and spent six weeks with us.

A number of gifts have been added to the Endowment Fund for Children's Work. This Fund is still open and frequently sums are sent in, a number in memory of friends. The most

gratifying of all these gifts was made by the recipients of the Alfred T. White Scholarship, which, for lack of funds, has lapsed in recent years. This group sent a delegation to my office in March and presented a book of letters of appreciation for what the Garden had done for them, and a check for $130 for the Endowment Fund. All these young people have been doing outstanding work in their professions, and last year Dr. Alfred Marshak received the Guggenheim Prize for Research, a compliment both to him and to us.

Miss Elma Edson assisted for about three months in the spring with our children's classes, and for extra help in the Children's Garden, Mr. Edward Johnson, a former Alfred T. White Scholarship recipient, and Miss Beatrice Clark were assigned for the summer.

During 1939 I acted as Secretary of the National Plant, Flower and Fruit Guild, one of the Directors of the School Garden Association of New York, a Vice-President of the School Garden Association of America, Consultant of the Federated Garden Clubs of New York State, and President of the American Nature Study Society.

Respectfully submitted,

ELLEN EDDY SHAW,
Curator of Elementary Instruction.

REPORT OF THE CURATOR OF PLANTS FOR 1939

TO THE DIRECTOR.

Herewith I submit my report for the year 1939:

WOODY PLANTS

Mr. Charles F. Doney, assistant in woody plants, reports that a number of new species were planted on the grounds during 1939. Among them may be mentioned *Rhamnella franguloides, Jasminum humile, Buddleia japonica, Styrax dasyantha, Abelia chinensis.*

Numerous trees and shrubs were moved from the nursery to the grounds or to the border mound along Flatbush Avenue. Nearly 400 labels were placed on trees and shrubs; approximately

half of these were replacements. Four groups with which I have for some time been occupied are lilacs, conifers, maples, and herbaceous plants; these have been planted near the south end of the nursery. Seventy-five plants from the nursery were given to the Dutch Garden, New City (Rockland County, N. Y.), through Mrs. Mowbray Clark.

Herbaceous Plants

The herbaceous beds are now approximately filled, but much improvement is possible in the way of greater diversity or to get species or varieties more desirable than those we now have. As an example, we now have about twenty species of *Dianthus,* and about forty species of *Sedum.* Several of these are closely alike and of doubtful identity. Something like 250 species of *Dianthus,* nearly 300 species of *Sedum* have been described. Which ones ought we to grow? We would prefer those that are attractive and at the same time definitely distinct. We can get many through the Seed Exchange. But it takes time to know what we want, and afterwards to get them, to say nothing of the difficulties of getting some of the rare plants established.

Greater diversity as to moisture, shade, or soil conditions would enable us to have greater variety. The Rock Garden and the Local Flora, with conditions so different from those in the beds, form valuable supplements in this respect.

In the latter part of May a visit was made to the Cronamere Nurseries at Greens Farms, near Greenwich, Connecticut, to inspect their very fine rock garden and to add material to our own collection.

Herbarium of Cultivated Plants

During the past year much of my time has been given, with the assistance of Mrs. Margaret Putz, to determinations and improvement of the herbarium of cultivated herbaceous plants.

Our use of half-size sheets followed an excellent suggestion made nearly twenty-five years ago by Dr. E. B. Southwick of the New York Botanical Garden. It has greatly simplified the study and expansion of our various collections: woody plants, herbaceous beds, rock garden, and conservatories. So many species come into

flower about the same time out-doors, that time does not always suffice for their determination. Winter, with herbarium specimens all "in flower," with library facilities and ample time, is more suitable for study.

In this connection a number of keys have been prepared for the larger genera. These include not just what we now have, but also what we would like to have. Gradually as we get the new plants, through the Seed Exchange or otherwise, we discard the less desirable species.

In several botanic gardens attempts have been made to keep card catalogs of cultivated plants. We tried it here, initially. As years pass a constantly increasing proportion of the cards refer to dead plants, and the cards become cumbersome for information about the living plants. For many years instead of cards we have used plant lists and maps of the various areas, which make effective plant records. Together with the annotated specimens, they enable us quickly to replace either labels or plants which may be lost. Whether the plant represented by the specimen is still living is not important, so long as we have a good herbarium of verified specimens.

Lilacs

During lilac flowering-time, about two weeks in May, nearly all my time was given to study of the varieties in our collection, with the assistance of Mr. Emil Barens.

Grass Plantation

The grass collection in the Garden was completely overhauled, under the supervision of Dr. George M. Reed. During the past few years a great many species had disappeared. Changes were made in the arrangement of the planting, and many new species were added to the collection. In most cases, only one species of a genus was planted; thus, there are almost as many genera represented as there are species. At the present time the collection includes approximately 35 perennial grasses. Some of these flower in June and early July; most of them, however, are late summer and fall blooming types. In addition, there are about 10 annuals, including plants of economic importance, such as wheat, oats, rye, barley, corn, and sorghum.

Map of the Garden

A map of part of the Garden was printed twelve years ago. For some time W.P.A. assistants were at work preparing a new map of the whole Garden. Last year arrangements were made to have the new map re-drawn by Mr. E. D. Weldon, of the American Geographic Society. This map is now (December) being printed in two colors, and should be ready for distribution early in 1940.

Evolution Group

A number of improvements, including the installment of new labels, were made in House No. 2 of the Conservatories, relating to Plant Classification and Evolution, illustrated on the opposite page. The general label for the house now reads as follows:

The Principal Groups of Plants

In this house plants are arranged to suggest relationship.

How do we find out these relationships?

(1) By comparing the different kinds of living plants with each other. (Morphology.)
(2) By comparing stages in the development of the individual plant. (Ontogeny.)
(3) By the study of plant fossils. (Paleontology.)

From such studies it is concluded:

That Algae represent the earliest or water stage of plant life.
That Lichens, Liverworts and *Psilotum* represent various early stages of plant life on land.
That Ferns are a middle stage of land life.
That Flowering Plants (Angiosperms) are the typical modern plants.

Included in this collection are a few models, made by Miss Purdy, namely: bread-mold (*Rhizopus*), *Peziza, Collybia, Boletus, Anthoceros, Rhymia,* and fern-prothallia with young sporophytes—plants not easily maintained in living and fruiting condition.

Classes

In the spring I gave ten outdoor lessons on Herbaceous Plants. Small specimens were given to members of the class and some

FIG. 9. Evolution of Plants Exhibit, Conservatory House No. 2. Center Bench: Liverworts and Mosses, Psilotum Group, Selaginella and Equisetum, Ferns, Cycads and Conifers. Right Bench: Monocotyledons by Families. Left Bench: Dicotyledons by Families. The Algae and Fungi are in the foreground not included in the photograph. (9913)

propagating material. Five lessons on "Lilacs in Flower" were given. A new feature was culture and propagation, taken up at the last meeting by Mr. Montague Free. Cuttings of selected varieties were rooted, and in September distributed to class members.

In the fall five lessons were given on the late flowering herbaceous plants; the last lesson, by Mr. Free, was on methods of propagation and division of roots. A generous quantity of roots of various species was distributed to members of the class.

Mr. Charles F. Doney, Assistant in Woody Plants, gave a course of ten lessons on Ornamental Shrubs in the spring.

In order to make these courses available to various groups I think it is desirable that they be given alternate years in the forenoon and in the afternoon.

Seed Exchange and Accessions

During the year seeds were collected as usual for the International Seed Exchange, and printer's copy was prepared for the annual Seed Exchange List. In exchange for 1,797 packets sent to our foreign exchanges, we received 1,422 packets of seeds of woody and herbaceous plants for the plantations and conservatories. Also 140 packets were accessioned by collection and by gift, and 377 packets were supplied to Botanic Garden members.

Statistics Relating to Living Plants

	Species or Varieties	*Plants*
Living Plants Received:		
By collection	5	12
By exchange	117	364
By gift	318	8,743
By purchase	126	369
Plants grown from seed	190	190
Total	756	9,678

Seed Exchange

Seed Packets Received:

By collection	39
By exchange	1,282
By gift	57
By purchase	47
Total	1,422

Seed Packets Distributed:

To members	377	
By exchange	1,797	
Total		2,174

Iris Collections

(Reported by Dr. George M. Reed)

Bearded Iris

Received by Exchange:

Mrs. Thomas Nesmith, Fairmount Gardens, Lowell, Mass.	11 varieties
Mr. Robert Wayman, Bayside, L. I.	21 "
Total	32 varieties

Miscellaneous Iris

Received by Exchange:

Mrs. J. H. Arbuckle, Columbus, Ohio	1 species	
Mr. W. H. Dole, West Orange, N. J.	1 "	
Dr. R. A. Harper, Ridgewood, N. J.	1 "	
Mr. J. A. Kemp, Little Silver, N. J.	2 "	(6 var.)
Miss Hilda Loines, Brooklyn, N. Y.	1 "	
Mrs. Thomas Nesmith, Fairmount Gardens, Lowell, Mass.	1 "	
Dr. H. K. Svenson, Brooklyn Botanic Garden	1 "	

Morea species

By Purchase:

Orpet Nursery, Santa Barbara, Cal.	11 species

Labels and Signs

Labels and signs were made by Mr. John McCallum as follows:

Small galvanized labels for Herbaceous Beds and Rose Garden fence	470
Large galvanized labels for the Herbaceous Beds	72
Lead labels for the woody plants	152
Lead labels for the Rock Garden and Greenhouses	151
Wood labels for Iris, Roses, etc.	348
Wooden signs	40
Cardboard signs	112
Twelve inch wood labels for special plantings	89
Wooden hanging labels for trees and shrubs	211
Painted zinc labels for Greenhouses	125
Total	1,770

Also numerous miscellaneous numbers and signs.

Respectfully submitted,

ALFRED GUNDERSEN,
Curator of Plants.

REPORT OF THE HORTICULTURIST FOR 1939

TO THE DIRECTOR:

I submit herewith my report for the year ending December 31, 1939.

Personnel

The number of gardeners and laborers has remained the same for the past four years in spite of increased work as noted in my report of last year. Three additional trained gardeners are urgently needed.

Student Observers

Three young men worked as student observers for a total of 191 days without pay (287 days less than in 1938).

Labor paid for by Government Relief Organizations

Works Progress Administration

Junior agronomist	160 days	1,488 hours*
Laborers (2)	88 "	

* 2,622 hours less than in 1938.

National Youth Administration

34 youths	480 6-hour days 1,440 8-hour days	14,400 hours*

* 4,428 hours more than in 1938.

Horticultural Section

Two thousand eight hundred plants, raised here, including 800 *Phlox subulata* varieties, were added to the wall garden.

New planting north of the Osborne Memorial included: 42 rhododendrons, and 34 evergreen and deciduous trees, all in large sizes.

At the south end of the "Long Green" two Box bushes 8 × 6 × 5 feet each, and four bushes each about 3 feet in diameter were planted.

The heath (*Erica*) and heather (*Calluna*) bed on the reservoir bank was extended 540 square feet and 1,200 new plants added.

Three thousand cubic feet of soil was removed from beneath the flagstone paving and transferred to the Local Flora Section. It was replaced by cinders and sand to provide a better foundation for the flagging, which was relaid and the crevices between the stones pointed with a mixture of sand and bituminous emulsion.

A flight of five concrete steps leading from the Horticultural Section to the Overlook was constructed by our own men.

Rose Garden

Twenty-four new varieties of Hybrid Tea roses (6 of each), 3 Polyantha varieties (38 in all), and 3 Climbers (2 of each) were planted to replace discarded varieties. Dead and unthrifty specimens in various groups were removed to make room for 318 new bushes. For the above roses we are indebted to Bobbink & Atkins, Rutherford, N. J., for 264 plants; Brownell Rose Research Gardens, Little Compton, R. I., 10 plants; The Conard-Pyle Co., West Grove, Pa., 92 plants; Henry A. Dreer, Philadelphia, Pa., 6 plants; Jackson & Perkins, Newark, N. Y., 128 plants; Vestal & Son, Little Rock, Ark., 6 plants.

Rectification of the lines of the terrace banks and change of grade required the addition of 30 cubic yards of soil to the Rose Arc. A concrete curb 158 ft. × 12 in. × 3½ in. was constructed along the main walk.

FIG. 10. Garden of Medicinal and Culinary Herbs. Facing East. (9883)

Bulb Planting

The Holland Bulb Industry presented 5,000 May-flowering tulip bulbs (planted in the borders along the west and north west sides of the experimental plot), and 1,000 hyacinths (planted in the two central beds of the Canna area). The hyacinths will blossom and can be removed before the time comes to set out the cannas. The soil was thoroughly prepared to a depth of 1½ feet before planting.

Two thousand corms of Gladiolus in 6 varieties, the gift of the Flowerfield Bulb Farm, Flowerfield, L. I., were planted in what was formerly the Ecological Section.

Border Mound

In pursuance of our policy of replacing commonplace material with more interesting plants, 59 duplicate trees and shrubs from the nursery were planted on the Border Mound. Owing to the dry season and the impossibility of watering these plants we expect to lose many of them.

The poplars along Washington Avenue were so badly damaged by the 1938 hurricane that it was decided to remove them and replant with young trees. The original planting was on a "hog-back" which was partly responsible for the severe loss in this section (only a few of the trees were uprooted in the section south of the entrance gate where they were planted on level ground) so before setting out 81 trees in the spring this mound was considerably flattened.

Museum Bank

The bank immediately west of the Medicinal and Culinary Herb Garden was planted with 77 flowering cherries and crabapples raised here by budding or grafting on seedling understocks.

Pests

Japanese beetles were less bothersome than in 1938; and sucking insects were fewer than usual. Summer sprays applied in 1939 amounted to 1,800 gallons as compared with 5,400 gallons in 1938.

Additional grass areas to the extent of 274,000 square feet were treated with lead arsenate against beetle larvae.

The dreaded black spot disease of roses was practically absent during 1939, but mildew was very prevalent towards the end of the growing season.

Miscellaneous

Three hundred and sixty feet of irrigation pipe and 5 faucets were installed in the experimental plot.

In the propagating houses 124 feet of iron pipe shelving and 84 feet of wood shelving were constructed.

A small, curved bridge of concrete was made and set to provide for foot traffic across the brook south of the Hill's Bridge.

In connection with the All-America Selections 84 different varieties of flower seeds were planted in the experimental plot, in rows allowing about 20 feet to each variety.

Exhibits

At the International Flower Show we installed an exhibit of house plants which was awarded a silver medal and a special prize. The display occupied 444 square feet and nearly 300 plotted plants were grouped according to their cultural requirements (sun, shade, moisture, etc.); and displayed on tables, flower stands, wall brackets, window shelves, and in window boxes, hanging pots, and terrariums. For a background "property" walls and windows were used. In this connection we had the helpful cooperation of the display department of the Abraham and Straus Store, of which Mr. Edward C. Blum, Chairman of our Board, is Chairman. The exhibit was popular with Flower Show visitors. For this occasion I prepared an eight-page "*Leaflet*" on house plants.[1]

In response to repeated requests from the California Horticultural Society during the past few years for an entry from the Garden in the California Spring Garden Show, we sent a small consignment of unusual house plants which was exhibited at the tenth Annual Show. For this we were given a First Award Blue Ribbon.

The exhibit of the Botanic Garden in Gardens on Parade, at the New York World's Fair, consists of two knot gardens and a

[1] The Brooklyn Botanic Garden exhibit of house plants. *Brooklyn Botanic Garden Leaflets*. Ser. 26. no. 1–2. March, 1939.

FIG. 11. World's Fair Exhibit: Knot Gardens and Culinary Herbs. Square, Sweet Violet (*V. odorata*); Circle, Germander (*Teucrium Chamedrys*); Left and Right Semi-circles, Lavender Cotton (*Santolina incana*); Front and Back Semi-circles, Common Thyme (*Thymus vulgaris*). A second Knot Garden of different design is at the far end, with the Culinary Herbs between (9889)

large bed devoted to culinary herbs. One of the knot gardens is copied from a design in the "Gardener's Labyrinth" by Dydymus Mountain (Thomas Hill), published in 1577. The other is an adaptation of a design from the same source. About 340 running feet of thyme, germander, lavender-cotton, etc., with the individual plants set 6 inches apart, were used in making the lines of the knots. Interspaces were surfaced with coal, yellow sand and flower-pot chips. More than 80 different herbs were planted in the large central bed. The entire planting space is about 70 × 15 feet.

In the New York City building at the World's Fair we installed and maintained an exhibit consisting of photographs, a model of the children's garden, and living plants (xerophytes) to fill a space of approximately 75 square feet.

Seed and Plant Distribution

In connection with the International Seed Exchange, 1,797 packets of seeds were distributed to foreign and domestic botanic gardens and other institutions. We distributed 377 packets of seeds to members of the Botanic Garden.

Living Plants Distributed:

To Members	3,396
By gift (to public institutions)	125
By exchange	1,711
Total	5,232

Cooperation with other Institutions

One truck load of palms and other decorative potted material from the Conservatories was given to the Department of Parks for use in the New York City Building at the New York World's Fair.

We supplied about 60 rock plants to help furnish the rock garden sponsored by the American Rock Garden Society in Gardens on Parade at the New York World's Fair.

Plants or propagating material were given to other institutions including: Barnard College and Brooklyn College, New York City;

Connecticut State College, Storrs, Conn.; New York State College of Forestry, Syracuse; St. Luke's Hospital and New York State Psychiatric Institute and Hospital (Occupational Therapy Department), New York City; The House of St. Giles the Cripple, Convalescent Home and School, Garden City, Long Island.

Courses of Instruction

I conducted the following "Courses for Members and the General Public" at the Botanic Garden:

Garden Plants and Flowers. One lecture in a course consisting of six lectures, by various members of the staff.

Lilacs in Flower. One lecture in a series of five outdoor lessons in the Garden.

Plants in the Home: How to grow them. Five talks with demonstrations.

Personal Activities

I continued to serve on the Lily Committee of the American Horticultural Society; on the Program Committee of the Radio Garden Club; on the Board of Directors of the American Rock Garden Society; on the Advisory Council for the course in Ornamental Horticulture at the State Institute of Applied Agriculture, Farmingdale, L. I.; and I again acted as Consultant for the Federated Garden Clubs of New York State, Inc.

I acted as Chairman of the Committee on Arrangements for the Annual Meeting of the American Rose Society which was held at the Brooklyn Botanic Garden, October 5 and 6.

I acted as a judge at the following flower shows:

March 13. Federated Garden Clubs of New York State, International Flower Show, New York City.

August 29. Flower Show of the Dutchess County Fair, Rhinebeck, New York.

September 11. Flower Show of the Consolidated Edison Company, New York.

Respectfully submitted,

Montague Free,
Horticulturist and Head Gardener.

REPORT OF THE CURATOR OF THE HERBARIUM FOR 1939

To the Director:

I submit herewith my report for the year ending December 31, 1939.

The Phanerogamic Herbarium

Reorganization of the herbarium collections is constantly going on: much time has been expended during the past year in identifying local collections.

For exchanges with other botanic gardens and gifts from universities and individuals, see the list of herbarium accessions, page 98.

The Local Flora Section

As to the Local Flora section (native plants), the need was mentioned last year of a limestone ledge to occupy the southwest corner of the Local Flora valley. A few limestone blocks were received in 1937 through the much appreciated cooperation of Mr. Bernhard Hoffman, of Stockbridge, Massachusetts, but many more are needed to complete the treatment as planned. This development will be the last one necessary to be carried out, all the other plant habitats having been provided for. Each year sees some changes in the Local Flora area. Many of these changes come about gradually through the natural growth of trees and shrubs and herbaceous plants which have supplanted the privets, willows, and weigela bushes which occupied such a large part of the area when it was remodeled in 1931. It is hoped that the three or four remaining privet bushes will disappear during the coming year. In this area devoted to naturalistic plantings the changes in topography are made correspondingly inobtrusive, yet a visitor should note that during the past season (1939) the peat area at the southern end of the meadow has been extended to provide bog conditions for some plants which cannot stand the crowded competition of our present bog. The slope adjacent to the rocky embankment along the bog has also been treated with peat to

provide a better habitat for northern plants. In the sand area adjacent to the pond the last representative of the big willow trees was partially blown down during the 1938 hurricane. The entire trunk was subsequently removed and for it was substituted a sour gum, *Nyssa sylvatica,* which should in a few years give just the right ecological accent to the borders of the pond. The inner slope of the border-mound parallel to Flatbush Avenue and near the Adolph Engler tulip tree has been reconstructed with peat and sand to provide a moraine-type of habitat for plants of northern mountain exposures, and, backed with rhododendrons, this area will become the source of the brook which now parallels the lower margin of the border-mound. The little ravine in the present rhododendron thicket has been deepened and the excavated material added partly to the border-mound and partly to the knoll, which is now growing up in hemlocks and white oaks. As each year goes by, the natural fall of leaves and the growth of roots lead to a betterment of forest conditions and a corresponding decrease in weeds. Our success in growing native plants in this area is, I believe, due in large part to the exclusion of fertilizers, which increase the growth of foreign weeds and which seem to be detrimental to most native plants.

To increase the display of early spring flowers two hundred trilliums were planted during 1939. A number of white pines were planted on the border-mound near the bog. During the coming year a fairly large planting of native rhododendrons and some hemlocks should be added to the slopes of the border-mound.

Herbarium Material Loaned

	Sheets
Charette, Mr. L. A., Burlington, Vt.	1
Core, Dr. E. L., West Virginia University, Morgantown, W. Va.	112
Correll, Mr. D. S., Botanical Museum, Harvard University	24
Grant, Dr. M. L., Iowa State Teachers College, Cedar Falls, Ia.	480
Hermann, Dr. F. J., U. S. Dept. of Agriculture, Washington, D. C. ..	9
Pyron, Dr. J. H., Duke University, Durham, N. C.	137
Strickland, Mr. J. C., Jr., University of Virginia, Charlottesville	51
Wolf, W., O.S.B., St. Bernard College, St. Bernard, Alabama	5
	819

Herbarium Material Borrowed for Study

Beetle, Mr. A. A., University of California, Berkeley, Calif.	85
Cory, Mr. V. L., Texas Agricultural Experiment Station, Sonora	5
Gates, Dr. F. C., Kansas State College, Manhattan, Kans.	251
Gray Herbarium, Cambridge, Massachusetts	67
Greenman, Dr. J. M., Missouri Botanical Garden, St. Louis, Mo.	79
Jennison, Dr. H. M., University of Tennessee, Knoxville, Tenn.	1
Merrill, Dr. E. D., Arnold Arboretum, Jamaica Plain, Massachusetts.	42
Missouri Botanical Garden, St. Louis, Missouri	4
Moldenke, Dr. H. N., New York Botanical Garden, Bronx Park, N. Y.	1
Morton, Dr. C. V., U. S. National Herbarium, Washington, D. C.	4
New York Botanical Garden, Bronx Park, N. Y.	1,557
Pyron, Dr. James, Duke University, Durham, N. C.	37
Standley, Dr. P. C., Field Museum, Chicago, Ill.	79
Underwood, Mr. J. K., University of Tennessee, Knoxville, Tenn.	50
U. S. Forest Service, Washington, D. C.	76
University of Pennsylvania, Philadelphia, Pa.	11
	2,349

Herbarium Accessions and Distribution

Phanerogamic Herbarium

Accessions:

By Gift:

Cooke, Mr. Wm. B., Foster, Warren Co., Ohio	2	
Deam, Mr. C. C., Bluffton, Ind.	16	
Drushel, Dr. J. A., Westfield, N. J.	104	
Gomez e Sousa, Mr. A. de F., Portuguese East Africa	2	
Kezer, Mr. James, Ithaca, N. Y.	21	
Kittredge, Miss E. M., Vergennes, Vt.	67	
Maheshwari, Dr. P., University of Allahabad, India	1	
Merrill, Dr. E. D., Arnold Arboretum, Jamaica Plain, Mass.	1	
Purer, Miss E. A., San Diego, Calif.	247	
Richards, Mrs. E. H., South Lyndeboro, N. H.	1	
Topping, Mr. D. LeR., Honolulu, T. H.	2	
Wolf, W., O.S.B., St. Bernard College, St. Bernard, Ala.	6	470

By Exchange:

Clokey, Mr. I. W., South Pasadena, Calif.	2	
Cooke, Mr. W. B., Foster, Warren Co., Ohio	4	
Fassett, Dr. N. C., University of Wisconsin, Madison	58	
Gilbert, Dr. F. A., Marshall College, Huntington, W. Va.	100	
Godfrey, Dr. R. F., Gray Herbarium, Cambridge, Mass.	8	

Gray Herbarium, Harvard University, Cambridge, Mass. .. 101
Greenman, Dr. J. M., Missouri Botanical Garden, St. Louis 48
Hanes, Mr. C. R., Schoolcraft, Michigan 7
Hermann, Dr. F. J., U. S. Department of Agriculture, Washington, D. C. 35
Howell, Mr. J. T., California Academy of Sciences, San Francisco, Calif. 72
Jennison, Dr. H. M., University of Tennessee, Knoxville .. 131
McCart, Mr. W. L., North Texas State Teachers College, Denton, Texas 102
Maguire, Dr. B., Utah State Agricultural College, Logan. 16
Missouri Botanical Garden, St. Louis, Mo. 34
Moldenke, Dr. H. N., New York Botanical Garden, Bronx Park 1
Penfound, Dr. W. T., Tulane University, New Orleans, La. 6
Pennell, Dr. F. W., Philadelphia Academy of Natural Sciences 206
Senn, Dr. H. A., Central Experimental Farm, Ottawa, Canada 39
Sharp, Dr. A. J., University of Tennessee, Knoxville, Tenn. 2
Smith, Dr. A. C., New York Botanical Garden, Bronx Park, N. Y. 3
Underwood, Mr. J. K., University of Tennessee, Knoxville 3
Wolf, W., O.S.B., St. Bernard College, St. Bernard, Ala.. 1
Woodson, Dr. R. E., Missouri Botanical Garden, St. Louis 61 1,040

By Collection:

Pierce, Miss M. E., Brooklyn Botanic Garden 35
Svenson, Dr. Henry K., Brooklyn Botanic Garden 2,652
Vilkomerson, Miss Hilda, Brooklyn Botanic Garden 4 2,691

By Purchase:

Kittredge, Miss E. M., Vergennes, Vt. 60
Loof, Mrs. H. B., Oak Harbor, Washington 263 323

4,524

Distribution:

By Exchange:

Camp, Dr. W. H., New York Botanical Garden, Bronx Park 7
Hermann, Dr. F. J., U. S. Department of Agriculture, Washington, D. C. 170
Jansson, Mr. K. P., Groton, Connecticut 150
Pyron, Dr. J. H., Duke University, Durham, N. C. 29
Underwood, Mr. J. K., University of Tennessee, Knoxville 184 540

By Gift:

Blaser, Mr. H. W., Ithaca, N. Y.	2	
Pennell, Dr. F. W., Philadelphia Academy of Natural Sciences	1	
Polunin, Dr. N., Oxford University, England	1	
Shaver, Dr. J. M., Peabody College, Nashville, Tenn.	3	
Sherff, Dr. E. E., Field Museum, Chicago, Ill.	3	
Wherry, Dr. E. T., University of Pennsylvania, Philadelphia	2	
Wolf, W., O.S.B., St. Bernard College, St. Bernard, Ala..	3	15
		555

Mycological Herbarium

Accessions:

By Exchange:

Dr. F. L. Tai, National Tsing Hua University, Kunming, China	2	2

By Purchase:

Supplement à la revue de Mycologie	12	
Dr. H. Sydow, Berlin, Germany		
Fungi Exotici Exsiccati, Fasc. 20, 21	100	
Mycotheca Germanica, Fasc. 61–64	200	312
		314

Respectfully submitted,

HENRY K. SVENSON,
Curator of the Herbarium.

REPORT ON THE LIBRARY FOR 1939

TO THE DIRECTOR:

I submit herewith my report for the year ending December 31, 1939.

ACCESSIONS

The collections at present comprise 38,625 pieces, of which number 20,787 are volumes and 17,838 are pamphlets, an increase of 244 volumes and 689 pamphlets, or 933 pieces during 1939. Volumes purchased totaled 81. Gifts during the year were 131

volumes, 352 pamphlets, and 825 parts. The list of donors is included in Appendix I.

Of periodicals and other serials the library received 770 as exchanges, 103 as gifts, 145 as purchases, and 6 through publication by the Garden, making a total of 1,024 titles.

List of some important accessions

Through the generosity of Mrs. Field's Literary Club, of Brooklyn, the library received a gift of $500 for the purchase of rare books, the collection to constitute a memorial to the club's founder, Mrs. George White Field. Following is a list of the items secured:

[Bobart, Jacob]. Catalogus plantarum horti medici Oxoniensis Sc. Latino Anglicus, & Anglico Latinus. [Oxonii], 1648.

Bretschneider, Emil. Botanicon Sinicum. Notes on Chinese botany from native and western sources. Shanghai, 1882–1895. 3 parts in 3 vols.

——. Early European researches into the flora of China. Shanghai, 1880. (Journal of the North-China branch of the Royal Asiatic Society. 1880, n. s. v. 15, art. 1.)

Brongniart, A. T. Prodrome d'une histoire des végétaux fossiles. Paris, 1828.

Dillenius, J. J. Historia muscorum in qua circiter sexcentae species veteres et novae ad sua genera relatae describuntur et iconibus genuinis illustrantur. Cum appendice et indice synonymorum. Oxford, 1741.

Duppa, Richard. Illustrations of the lotus of the ancients, and tamara of India. London, 1816.

Ellis, John. Directions for bringing over seeds and plants from the East-Indies . . . to which is added, the figure and botanical description of a new sensitive plant, called Dionaea muscipula: or, Venus's fly-trap. London, 1770.

Helmont, J. B. van. Ortus medicinae . . . Amsterodami, 1648.

Hofmeister, Wilhelm. Vergleichende Untersuchungen der Keimung, Entfaltung und Fruchtbildung höherer Kryptogamen . . . Leipzig, 1851.

Knight, T. A. A Selection from the physiological and horticultural papers, published in the Transactions of the Royal and Horticultural Societies . . . to which is prefixed, a sketch of his life. London, 1841.

Ledebour, C. F. von. Icones plantarum novarum vel imperfecti cognitarum floram rossicam, imprimis, altaicam, illustrantis. Rigae, 1829–1834. 5 vols.

Linné, Carl von. Genera plantarum. [1st edition] Lugduni Batavorum, 1737.

Moricand, M. E. Plantes nouvelles d'Amérique. Genève, 1833–1846.

Pasteur, Louis. Le Budget de la science. Paris, 1868.

Pasteur, Louis. Examen critique d'un écrit posthume de Claude Bernard sur la fermentation. Paris, 1879.

——. Mémoire sur les corpuscles organisés qui existent dans l'atmosphère, examen de la doctrine des générations spontanées. (Annales de chimie et de physique. ser. 3, v. 64, 1862. p. 5–110.)

Plinius Secundus, Cajus. The Natural history of Pliny. Translated . . . by . . . John Bostock and H. T. Riley . . . London, 1855–1857. 6 vols.

Walter, Thomas. Flora Caroliniana. Londini, 1788.

From the income of other funds the following items were secured:

Cordus, Valerius. . . . Annotationes in Pedacij Dioscoridis Anazarbeide Medica materia libros V . . . Argentorati, 1561.

Helmont, J. B. van. Oriatrike, or, Physick refined . . . London, 1662.

Rafinesque, C. S. S. Principes fondamentaux de somiologie ou les loix de la nomenclature et de la classification de l'empire organique . . . Palerme, 1814.

Vaillant, Sebastien. Discours sur la structure des fleurs . . . Leide, 1718.

Library Work

Reclassification of the library collections has proceeded during the year so that completion of this project is in sight. Classes 800 and 900, the Pre-Linnean collection, and the Children's Club Room Library remain to be done.

Exhibits of books were arranged for the meeting at the Garden of the American Rose Society on October 5th, and for the Conference on medicinal herbs held October 26th. All the books on roses, together with runs of serials dealing especially with roses, were placed out for the inspection of members of the Society. Especially commented on was a display of plant patents for new roses issued by the United States Patent Office. For the Conference on medicinal herbs a display of early herbals was arranged in cases in the rotunda and in the library.

Interlibrary Loans

Books were loaned to: Bishop Loughlin Memorial High School, Brooklyn; Carnegie Institution of Washington, Dept. of Genetics, Cold Spring Harbor, L. I.; Columbia University, New York; Kentucky Agricultural Experiment Station, Lexington; Long Is-

land College of Medicine, Brooklyn; Mountain Lake Biological Station, Va.; New York Botanical Garden; New York State College of Agriculture, Ithaca, N. Y.; Newark Public Library; Pratt Institute Free Library, Brooklyn; Princeton University, Princeton, N. J.; Rockefeller Institute for Medical Research, New York and Princeton, N. J.; St. Joseph's Convent, Brentwood, N. Y.

Books were borrowed from: American Museum of Natural History, New York; Brooklyn Public Library; Columbia University, New York; Kings County Medical Society, Brooklyn; New York Botanical Garden; New York Horticultural Society; New York State College of Agriculture, Ithaca, N. Y.; Yale University, New Haven, Conn.

The statistical report follows.

Respectfully submitted,

WILLIAM E. JORDAN,
Librarian.

STATISTICAL REPORT ON THE LIBRARY

ACCESSIONS

	Autograph Letters	Portraits	Volumes	Pamphlets	Parts (Including Periodicals)
Exchange	0	0	28	144	3,991
Gift	12	26	131	352	825
Publication	0	0	0	192	53
Purchase	0	2	81	1	996
By binding	0	0	4	0	0
Total	12	28	244	689	5,865

Total number of volumes in library, December 31, 1938	20,543
Number of volumes added during 1939	244
Total number of volumes in library, December 31, 1939	20,787
Total number of pamphlets in library, December 31, 1938	17,149
Number of pamphlets added during 1939	689
Total number of pamphlets in library, December 31, 1939	17,838
Total number of volumes and pamphlets in library, December 31, 1938	37,692
Net increase of volumes and pamphlets during 1939	933
Total number of volumes and pamphlets in library, December 31, 1939	38,625

American Fern Society Collection

Number of volumes, December 31, 1938	44
Number of volumes added during 1939	3
Total number of volumes, December 31, 1939	47
Number of pamphlets, December 31, 1938	282
Number of pamphlets added during 1939	8
Total number of pamphlets, December 31, 1939	290
Number of parts added during 1939	8

Serials and Periodicals

(Including only those of which numbers were received in 1939)

Subscription	145
Gift	103
Exchange	770
Publication	6
Total	1,024

CATALOGING

Books, Pamphlets, and Serials catalogued	1,301
Total number of cards typewritten and filed	2,041

Printed Cards

Torrey Botanical Club index cards on file, December 31, 1938	55,021
Filed during 1939	2,028
Total, December 31, 1939	57,049

MISCELLANEOUS

Number of users of the library	4,956
Books lent to members of the staff	1,222
Books lent to other institutions	69
Books borrowed from other institutions	26

REPORT OF THE RESIDENT INVESTIGATOR (FERNS) FOR 1939

TO THE DIRECTOR:

I submit herewith my report for the year ending December 31, 1939.

SCHOOL SERVICE

At the January meeting of the New York Association of Biology Teachers, the program consisted of a series of papers under the auspices of the "Benedict Seminar Committee."

Editorial Work

During 1939 the 29th year of my connection with the editorial staff of the *American Fern Journal* was completed. During most of that period the Botanic Garden has served as a basis for this editorial work, and during the latter years the back files of the Journal have been housed and serviced here at the Garden. In February a special meeting of the American Fern Society was held at the Botanic Garden, with an exhibit of a large number of fern photographs. The meeting included a conference of editors of the Journal, of the officers of the Fern Society, and a general business meeting, as well as an inspection of the Botanic Garden Collection of ferns.

During the year a number of reviews were prepared and published—chiefly in *Science* and in *Torreya,* the latter at the request of the Editor, Mr. George T. Hastings.

Plant Conservation

Plant conservation continues as a subject of widespread interest, and during the summer the writer was called upon to speak at a general conservation meeting held at Bolton, Lake George, New York. At that time, it was a matter of great interest to learn of a definite gain in the field of native plant conservation, which has been the result of the amendment to the New York State Conservation Law, sponsored in Brooklyn Botanic Garden publications some fifteen years ago. That amendment consisted in the listing of a number of rare plant species (see "The Plant Wards of New York State," Brooklyn Botanic Garden *Leaflets,* Series 18, No. 5) as protected forms not to be picked and collected on public lands. Some people in plant conservation at that time were disposed to belittle the value of such laws in a campaign for the protection of native species. However, a concrete gain may be cited in a resolution adopted by the Federated Garden Clubs of New York State, Inc., forwarded by Mrs. John W. Draper, State Chairman of Conservation, by which the use in garden shows of member-clubs of any of the plant species protected by New York State law is banned. These protected species are admissible, ac-

cording to the resolution, only when presented as part of scientific exhibits. The resolution reads as follows:

"Since the State of New York has seen fit to place under the protection of State Law those wild flowers which are facing utter extermination, I move that this Board of Directors shall uphold the State in its efforts to conserve these plants; also that it shall ask that all said plants be not included in the Flower Shows of the member clubs in this organization."

Experimental culture of native species has been continued, and provisions for the better growth of hardy ferns were provided by a lath shelter in the experimental grounds. Here a number of interesting species are being tested under our weather conditions. These include two or three northern species, and also types from southern states which are being tested for hardiness. A considerable culture of a Florida species, *Dryopteris ludoviciana,* has been raised from spores. Some plants were distributed for outside testing. The experimental culture of a number of Florida fern species has also been instituted. The conservation of native plants of Florida is a serious present problem through the extension of agricultural and industrial activity in that State. From Mrs. W. D. Diddell, Jacksonville, Florida, the Botanic Garden has recently received a collection of lime-sink species. It is hoped that these may be successfully grown and multiplied under greenhouse conditions.

Respectfully submitted,

RALPH C. BENEDICT,
Resident Investigator (Ferns).

REPORT OF THE RESIDENT INVESTIGATOR (ECONOMIC PLANTS) FOR 1939

TO THE DIRECTOR:

I herewith submit a report of the activities of the Resident Investigator for Economic Plants during 1939. With the consent of the Garden, the Brooklyn Botanic Garden—Long Island University Course (B–15, 16) in Economic Plants, was omitted during

the 1939–1940 academic year. The development of the Herb and Medicinal Garden, which was formally opened on September 27, 1938, made it possible for the Brooklyn Botanic Garden to hold a successful "Conference on Medicinal Herbs" on October 26, 1939. It was the privilege and pleasure of the Resident Investigator for Economic Plants to serve as Chairman of the Committee on Arrangements. It was our good fortune, with the aid of the Director of the Garden, to obtain two nationally prominent speakers. Dr. Howard W. Haggard, of Yale University, addressed the meeting on the "History of the Use of Plants in Medicine," and Dr. Ernest Fullerton Cook, of the Philadelphia College of Pharmacy, spoke upon "Modern Use of Plants in Medicine." At the Reception in the Rotunda, an Exhibit of Rare Old Herbals was shown in the adjacent reading room of the library. I believe the Conference did much to introduce favorably to the physicians and pharmacists of Brooklyn, this new phase of the program of public service conducted by the Brooklyn Botanic Garden.

Reports on research, lectures, and publications are given elsewhere in the Annual Report under their respective headings.

Respectfully submitted,

RALPH H. CHENEY,
Resident Investigator (Economic Plants).

FINANCIAL STATEMENT FOR 1939

I *a.* Tax Budget Accounts January 1, 1939–June 30, 1939*

Code No.	*Account*	*Appropriated*	*Expended*	*Balance June 30, 1939*
	Personal Service			
1530	Regular Employees	$31,812.60	$31,812.60	$ 0.00
1531	Temporary Employees	8,750.00	8,750.00	0.00
	Total Personal Service	40,562.60	40,562.60	0.00
	Other Than Personal Service			
1532	Fuel Supplies	2,000.00[1]	1,999.11	.89
1533	Office Supplies	338.00	338.00	0.00
1534	Laundry, Clean. & Dis. Sup.	100.00	100.00	0.00
1535	Bot. & Agric. Supplies	1,400.00	1,399.99	.01
1536	Motor Vehicle Supplies	38.00[2]	37.98	.02
1537	General Plant Supplies	100.00	100.00	0.00
1538	Office Equipment	75.00	75.00	0.00
1539	General Plant Equipment	1,150.00	1,150.00	0.00
1540	General Plant Materials	700.00	700.00	0.00
1541	Repairs and Replacements	1,000.00	1,000.00	0.00
1542	Telephone Service	250.00	239.97	10.03
1543	Carfare	25.00	25.00	0.00
1544	Expressage and Deliveries	100.00	100.00	0.00
1545	General Plant Service	200.00	200.00	0.00
1546	Contingencies	25.00	25.00	0.00
	Total Other Than Personal Service	$ 7,501.00	$ 7,490.05	$10.95
	Total Expended		48,052.65	
	Balance June 30, 1939			$10.95

* The change in the fiscal period of the City of New York from the calendar year to the period beginning July 1 and ending on June 30 of the following year makes it necessary to show the results of operations in two separate statements, i.e., one covering the period from January 1, 1939 to June 30, 1939, the other covering the period from July 1, 1939 to December 31, 1939.

[1] Transferred to Department of Purchase General Purchase Fund—$2000.00

[2] Transferred to Department of Purchase General Purchase Fund—$ 38.00

Code No.	*Account*	*Appropriated for period 7/1/39 -6/30/40*	*Expended 7/1/39 -12/31/39*	*Balance Dec. 31, 1939*
	Personal Service			
1530	Regular Employees	$63,350.00	$31,524.56	$31,825.44
1531	Temporary Employees	18,750.00	9,593.00	9,157.00
	Total Personal Service	82,100.00	41,117.56	40,982.44
	Other than Personal Service			
1532	Fuel Supplies	4,000.00[1]	1,634.12	2,365.88
1533	Office Supplies	675.00	182.70	492.30
1534	Laundry, Clean. & Dis. Sup.	200.00	91.68	108.32
1535	Bot. & Agric. Supplies	2,500.00	252.69	2,247.31
1536	Motor Vehicle Supplies	75.00[2]	45.98	29.02
1537	General Plant Supplies	200.00	30.61	169.39
1538	Office Equipment	150.00	5.25	144.75
1539	General Plant Equipment	2,000.00	292.48	1,707.52
1540	General Plant Materials	1,400.00	609.23	790.77
1541	Repairs and Replacements	2,000.00	1,060.24	939.76
1542	Telephone Service	450.00	164.41	285.59
1543	Carfare	50.00	0.00	50.00
1544	Expressage & Deliveries	200.00	46.73	153.27
1545	General Plant Service	400.00	0.00	400.00
1546	Contingencies	50.00	0.00	50.00
	Total Other Than Personal Service	$14,350.00	$ 4,416.12	$ 9,933.88
	Totals	$96,450.00	$45.533.68	$50,916.32

[1] Transferred to Department of Purchase General Purchase Fund—$4000.00
[2] Transferred to Department of Purchase General Purchase Fund—$ 75.00

II. Private Funds Account

Permanent Funds (Restricted[1])	*Principal*	*Balance Jan. 1, 1939*	*Income*	*Available*	*Expended*	*Balance Dec. 31, 1939*
1. Endowment Fund	$ 50,500.00	$ 0.00	$ 1,767.48	$ 1,767.48	$ 1,767.48	$ 0.00
2. Life Membership	7,600.00	0.00	266.00	266.00	266.00	0.00
3. George E. Brackett	500.00	4.37	13.11	17.48	16.99	.49
4. Benjamin Stuart Gager	13,417.20	28.03	469.60	497.63	382.92	114.71
5. Martha Woodward Stutzer	10,000.00	.20	350.00	350.20	342.27	7.93
6. Mary Bates Spalding	2,697.00	263.48	94.36	357.84	238.37	119.47
7. Alfred T. White	243,149.27	0.00	8,510.24	8,510.24	8,510.24	0.00
8. A. Augustus Healy Bequest	9,798.31	0.00	342.92	342.92	342.92	0.00
9. Robert B. Woodward	25,000.00	0.00	875.00	875,00	875.00	0.00
10. Endowment Increment	146,234.20	431.86	5,044.65	5,476.51	5,476.51	0.00
11. A. T. White Memorial Tablet	3,889.85	0.00	136.12	136.12	136.12	0.00
12. Brooklyn Institute Centennial	30,000.00	0.00	1,050.00	1,050.00	1,050.00	0.00
13. John D. Rockefeller, Jr.	250,000.00	0.00	8,750.00	8,750.00	8,750.00	0.00
14. Citizens' Endowment	253,929.26	0.00	8,887.51	8,887.51	8,887.51	0.00
15. Henry W. Healy Trust	53,660.92	36.40	1,425.36	1,461.76	1,435.76	26.00
16. Mrs. H. C. Folger	1,000.00	32.62	35.00	67.62	49.58	18.04
17. John W. Frothingham	10,000.00	0.00	363.61	363.61	346.59	17.02
18. F. E. W. Fund	250,000.00	125.81	8,750.00	8,875.81	8,875.81	0.00
19. Ellen Eddy Shaw Endowment	10,667.30	0.00	264.51	264.51	0.00	264.51
20. Herbarium Endowment	2,345.04	0.00	66.62	66.62	63.30	3.32
Total	$1,374,388.35	$ 922.77	$47,462.09	$ 48,384.86	$47,813.37	$ 571.49
Special Accounts (Restricted)						
21. Ella Reussner Tr. Income Account		0.00	2,155.18	2,155.18	1,315.60	839.58
22. Sustaining Membership		49.98	483.14	533.12	391.51	141.61
23. Annual Membership		93.29	3,989.82	4,083.11	3,777.52	305.59
24. Tuition & Sales		3,559.51	12,149.81	15,709.32	14,389.42	1,319.90
25. Collections Fund		462.91	3,997.79	4,460.70	4,242.52	218.18
26. Cary Library Fund		8.63	70.00	78.63	76.21	2.42
27. Special Purposes		8,056.70	11,979.32	20,036.02	17,837.21[2]	2,198.81
28. Plant Pathology Research		0.00	4,000.00[3]	4,000.00[3]	4,000.00[3]	0.00
29. Special Contributions		917.27	305.93	1,223.20	194.79	1,028.41
Total		$13,148.29	$39,130.99	$ 52,279.28	$46,224.78	$6,054.50
Grand Total	$1,374,388.35	$14,071.06	$86,593.08	$100,664.14	$94,038.15	$6,625.99

[1] To the educational and scientific work of the Garden.
[2] Includes $1,140.50 transferred to Principal, line 19, and $150.00 transferred to Principal, line 20.
[3] Not including $2000.00 transferred from line 18.

III. Summary of Total Maintenance Budget for 1939

	Income			*Expended*			
	Personal Service	*Other than Personal Service*	*Total*	*Personal Service*	*Other than Personal Service*	*Total*	*Balance*
Tax Budget Appropriation 1/1/39–6/30/39	$ 40,562.60	$ 7,501.00	$ 48,063.60				
Tax Budget Appropriation 7/1/39–6/30/40	82,100.00	14,350.00	96,450.00				
Total	$122,662.60	$21,851.00	$144,513.60				
Less balance at 12/31/39 of Tax Budget appropriation for 7/1/39–6/30/40	$ 40,982.44	9,933.88	50,916.32				
Tax Budget (48.18%)	$ 81,680.16	11,917.12	93,597.28	$ 81,680.16	$11,906.17	$ 93,586.33	$ 10.95[1]
Private Funds (51.82%) Budget	60,539.57	40,124.57	100,664.14	59,511.16	34,526.99	94,038.15	6,625.99
Totals	$142,219.73	$52,041.69	$194,261.42	$141,191.32	$46,433.16	$187,624.48	$6,625.99

[1] Balance reverted to City.

Respectfully submitted,

Thomas A. Donnelly,

Secretary and Accountant.

Note: The above "Financial Statement" is a transcript of Brooklyn Botanic Garden accounts in the books of the Treasurer of The Brooklyn Institute of Arts and Sciences. The Treasurer's accounts are audited annually by a Public Accountant, and a separate audit of this "Financial Statement" is not made in order to save unnecessary expense.

Edwin P. Maynard,

Treasurer.

APPENDIX I

GIFTS RECEIVED DURING 1939

Collections Fund *

Mrs. J. D. Allen
Mrs. Frank L. Babbott
Battle Pass Chapter D. A. R.
Philip A. Benson
Miss Dorothy L. Betts
Frank D. Brower
Mrs. Grace L. Brunn
Mrs. Glentworth R. Butler
Miss Mary E. Butterick
Mrs. S. Parkes Cadman
Miss Mary Campbell
Mary D. Carroll
W. R. Coe
Mrs. W. V. Cranford
Walter H. Crittenden
Mr. & Mrs. Sidney W. Davidson
Mrs. John R. Delafield
Miss Elizabeth H. Dutcher
Walter D. Ebinger
Otto Ebel
Walter Ebel
Mrs. Frances W. Emerson
Lewis L. Fawcett
Mrs. Lewis W. Frances
Mrs. William H. Good
Mrs. J. Morton Halstead
Chas. M. Higgins & Co., Inc.
William T. Hunter
Miss C. Julie M. Husson
Mrs. Raymond V. Ingersoll
Edward A. Ingraham
Miss Frances T. Ingraham
Mrs. Palmer H. Jadwin
William L. James
Miss Jeannetta C. Jameson
Mrs. P. Chalmers Jameson
Miss Hilda Loines
Mrs. George Lyons & Family
Mrs. W. W. Marshall
George V. McLaughlin
Mrs. Frank Melville
Mrs. Charles E. Perkins
Mrs. James H. Post
Charles Pratt
Mrs. Frederick B. Pratt
Mrs. Benjamin Prince
Mrs. William A. Putnam
Alonzo B. See
Mrs. John J. Sheridan
Miss Elise W. Stutzer
Mrs. Tracy S. Voorhees
"C. W."
Edwin G. Warner
Mrs. Walter F. Wells
Mrs. Alexander M. White
Miss Harriett H. White
Women of '76 Chapter N. S. D. A. R.
Miss Frances E. Woodward
Peter Piper Wright
Abigail Young

Architectural Features of the Long Green

Mrs. Dean C. Osborne, Executrix, For Completion of Architectural Features, Horticultural Section $7,208.44

Flower Show Exhibit

International Exposition Company 500.00

Special Gifts for Children's Work

Anonymous 25.00
Boys and Girls Club 55.00

* *Note.*—Contributions to the Brooklyn Botanic Garden constitute proper deductions under the Federal Income Tax Law.

Ellen Eddy Shaw Endowment Fund

Through the Woman's Auxiliary (from fifty-eight contributors). $1,140.50

Mrs. Fields Memorial Fund

Mrs. Field's Literary Club (for rare publications for the Library) 500.00

Japanese Gardening and Floral Art

Anonymous 220.00

Library

Books

American Rose Society, Harrisburg, Pa. 1
Brooklyn Botanic Garden Woman's Auxiliary, Library Committee 1
Butler, Mrs. Glentworth Reeve, New Haven, Conn. 3
Cabot, Mrs. Irving L., Brooklyn, N. Y. 1
Carnegie Institution of Washington, Washington, D. C. 5
Chilean Nitrate Educational Bureau, Inc., New York, N. Y. 1
Cleveland, O., Dept. of Parks 1
Crow, Miss Alice T., Brooklyn, N. Y. 2
Derringer, Mrs. Adelaide, Baltimore, Md. 1
Dittman, Mr. Richard, Brooklyn, N. Y. 1
Dorward, Miss Margaret M., Brooklyn, N. Y. 1
Felter, Mrs. Mary Benton, Brooklyn, N. Y. 1
Fred, Dean E. B., Madison, Wisc. 1
Gager, Dr. C. Stuart, Brooklyn, N. Y. 46
Gager, Mrs. C. Stuart, Brooklyn, N. Y. 2
Japanese Government Railways, Board of Tourist Industry, Tokyo ... 3
Kirk, Miss Isabel, Brooklyn, N. Y. 1
Maxwell Annex, Class 1937, Girls' Commercial High School, Brooklyn. 1
Morrison, Mr. Gordon, Rochester, Mich. 1
Mrs. Field's Literary Club, Brooklyn, N. Y. 29
New York University Class in Teaching of Elementary Science 3
Palmitier, Miss Edna A., Brooklyn, N. Y. 2
Porterfield, Mr. W. M., Jr., New York, N. Y. 1
P. S. 233, Parent Teachers' Association, Brooklyn, N. Y. 1
Ramaley, Dr. Francis, Boulder, Col. 1
Sherman, Mr. Julius, Brooklyn, N. Y. 1
Sherwin, Miss Gladys, Brooklyn, N. Y. 1
Sherwin, Miss Jean, Brooklyn, N. Y. 1
Sutcliffe, Miss Alys, Brooklyn, N. Y. 1
Vestal, Mr. Paul A., Cambridge, Mass. 1
Weissberg, Mr. Joseph, Brooklyn, N. Y. 1
Woodward, Miss Mary B., Brooklyn, N. Y. 1

Total 118

Pamphlets

American Potash Institute, Inc., Washington, D. C. 12
Benedict, Dr. Ralph Curtiss, Brooklyn, N. Y. 3
Brooks, Dr. Matilda M., Berkeley, Cal. 2
Brooks, Prof. S. C., Berkeley, Cal. 4
Charles F. Kettering Foundation, Yellow Springs, O. 9
Cheney, Dr. Ralph Holt, Brooklyn, N. Y. 2
Chiarugi, Prof. Alberto, Pisa, Italy 6
Corning Glass Works, Corning, N. Y. 1
Fischer, Prof. Hans, Munich, Germany 26
Fosberg, Mr. F. Raymond, Philadelphia, Pa. 6
Free, Mr. Montague, Brooklyn, N. Y. 4
Gager, Dr. C. Stuart, Brooklyn, N. Y. 160
Gilmer, Mrs. Knox, Wellington, New Zealand 2
Graves, Dr. Arthur Harmount, Brooklyn, N. Y. 15
Greenfield, Mr. Sidney S., Brooklyn, N. Y. 1
Gundersen, Dr. Alfred, Brooklyn, N. Y. 3
Haskins, Dr. C. P., Schenectady, N. Y. 1
Hotel Times Square, New York, N. Y. 1
Kelley, Dr. Arthur Pierson, Landenberg, Pa. 2
Kilner, Mr. F. R., Chicago, Ill. 1
Klauber, Mr. L. M., San Diego, Cal. 1
Knowles, Mr. John H., London, Eng. 1
Kolk, Dr. Laura A., Brooklyn, N. Y. 1
Leonard, Mr. Emery C., Washington, D. C. 14
Lovell, Mrs. John Harvey, Waldoboro, Me. 15
Lumsden, Dr. D. V., Beltsville, Md. 1
Marie Therese, Sister, Brentwood, N. Y. 2
Martin, Mrs. Everett P., Flushing, L. I. 1
Miki, Prof. Shigeru, Kyoto, Japan 3
Morrison, Mr. Gordon, Rochester, Mich. 1
Musée Colonial de Marseille, Marseille, France 1
Pierce, Miss Mary Elizabeth, Brooklyn, N. Y. 5
Porsild, Mr. A. E., Ottawa, Canada 2
St. John, Mr. Harold, Honolulu, Hawaii 3
Santa Barbara Botanic Garden, Santa Barbara, Cal. 1
Shaw, Mr. Lyle G., Brooklyn, N. Y. 1
Solis, Dr. M. Acosta, Quito, Ecuador 3
Stanley, Dr. Wendell Meredith, Princeton, N. J. 16
Svenson, Dr. Henry K., Brooklyn, N. Y. 1
Swan, Mr. Walter A., Rochester, N. Y. 1
Triebold, Mr. K., Bielefeld, Germany 1
United Brewers' Industrial Foundation, New York, N. Y. 2
Van Klooster, Prof. H. S., Troy, N. Y. 1
Van Sinderen, Mr. Adrian, Brooklyn, N. Y. 1

Veterinary and Agricultural College, Library, Copenhagen, Denmark ..	1
Vilkomerson, Miss Hilda, Brooklyn, N. Y.	3
Washington State Apple Advertising Commission, Wenatchee, Wash...	1
Total	345

Parts of Publications

(Exclusive of Government Documents)

Allan Hancock Foundations, Los Angeles, Cal.	5
American City, Publicity Division, New York, N. Y.	1
American Fern Society	5
American Horticultural Society, Washington, D. C.	4
American Museum of Natural History, New York, N. Y.	1
American Potash Institute, Inc., Washington, D. C.	2
American Scenic and Historic Preservation Society, New York, N. Y..	1
Ames, Prof. Oakes, Cambridge, Mass.	8
Association Canadienne Française pour l'Avancement des Sciences, Montreal, Canada	1
Bailey, Prof. L. H., Ithaca, N. Y.	2
Bernice P. Bishop Museum, Honolulu, Hawaii	1
Cambridge Botanic Garden Syndicate, Cambridge, Eng.	1
Carnegie Institution of Washington, Washington, D. C.	7
Chanousia, Giardino Botanico Alpino, Turin, Italy	1
Clarkson, Mrs. Rosetta E., Milford, Conn.	10
Danmarks Naturfrednings-forening, Copenhagen, Denmark	1
Davey Tree Expert Company, Kent, Ohio	4
DuPont de Nemours & Company, Inc., Wilmington, Del.	7
Eastern Shade Tree Conference, Bronx Park, N. Y.	1
Fisher Scientific Company, Pittsburgh, Pa.	5
Fosberg, Mr. F. Raymond, Philadelphia, Pa.	2
Francis, Mrs. Lewis F., Brooklyn, N. Y.	2
Free, Mr. Montague, Brooklyn, N. Y.	23
Gager, Dr. C. Stuart, Brooklyn, N. Y.	74
Gilmer, Mrs. Knox, Wellington, New Zealand	1
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	45
Gray Herbarium, Harvard University, Cambridge, Mass.	2
Haskins, Dr. C. P., Schenectady, N. Y.	17
Hawaii, University of, Honolulu, Hawaii	1
Hawaiian Academy of Science, Honolulu, Hawaii	1
Herb Society of America, Boston, Mass.	1
Illinois Audubon Society, Chicago, Ill.	3
Japanese Government Railways, Board of Tourist Industry, Tokyo	1
Jenkins, Mr. Charles F., Germantown, Philadelphia, Pa.	4
John Innes Horticultural Institution, London, Eng.	1
Josselyn Botanical Society, Orono, Me.	1

Klauber, Mr. L. M., San Diego, Cal.	1
Lemmon, Mr. Robert S., New Canaan, Conn.	12
Lewis, Mr. Clarence McK., New York, N. Y.	1
Loew, Mr. Fred A., Huntington, Ind.	1
McFarland, J. Horace Co., Harrisburg, Pa.	1
Marie Therese, Sister, Brentwood, N. Y.	1
Medical Society of the County of Kings, Brooklyn, N. Y.	13
Missouri Resources Museum, Jefferson City, Mo.	1
Montana State University Library, Missoula, Mont.	29
Morrison, Mr. Gordon, Rochester, Mich.	3
Mt. Desert Island Biological Laboratory, Mt. Desert, Me.	1
National Academy of Sciences, Washington, D. C.	1
National Research Council, Division of Biology and Agriculture, Washington, D. C.	1
National Research Council of Canada, Ottawa, Can.	1
New York Association of Biology Teachers, New York, N. Y.	8
Reed, Dr. George M., Brooklyn, N. Y.	43
Rhode Island Horticultural Society, Providence, R. I.	1
Rockefeller Institute for Medical Research, Library, New York, N. Y.	4
Rothamsted Experiment Station, Harpenden, Eng.	1
School Garden Association, New York, N. Y.	7
School Nature League, New York, N. Y.	10
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	25
Société Française des Chrysanthemistes, Lyon, France	4
Solis, Dr. M. Acosta, Quito, Ecuador	3
Southern Methodist University, Dallas, Tex.	2
Stanford University, Palo Alto, Cal.	16
Towson Nurseries, Inc., Towson, Md.	4
Upsala, Sweden, Botanical Institute	2
Van Sinderen, Mr. Adrian, Brooklyn, N. Y.	2
Virginia Academy of Science, Committee on State Flora, Lynchburg, Va.	25
West Virginia University, Herbarium, Morgantown, W. Va.	2
White, Dr. Orland E., Charlottesville, Va.	1
Wilderness Society, Washington, D. C.	2
Yale University, School of Forestry, New Haven	4
Total	480

Portraits and Photographs

Barbey, Mr. A., Lausanne, Switzerland	1
Christy, Mr. Francis T., New York, N. Y.	1
Cranford, Mrs. Walter V., Greenwich, Conn.	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	8
Guillaumin, Prof. A., Paris, France	2
Lovell, Mrs. J. H., Waldoboro, Me.	3

Nelson Bros., Long Island City, N. Y.	2
Osborne, Mrs. Dean C., Brooklyn, N. Y.	2
Ramaley, Prof. Francis, Boulder, Col.	3
Reynolds, Mrs. Robert, Cambridge, Mass.	1
Siple, Mr. E. W., Troy, N. Y.	2
Total	26

Autograph Letters

Gager, Dr. C. Stuart, Brooklyn, N. Y. 12

Miscellaneous

Free, Mr. Montague, Brooklyn, N. Y. 1 postcard.

Gager, Dr. C. Stuart, Brooklyn, N. Y. 1 place card, International Horticultural Congress; 1 postcard picture (Robinier de Robin); 2 picture postcard albums; 1 obituary card (Manabu Miyoshi); Biographical material on Stephen Calverley; Biographical material on the Prince family of Flushing; Membership certificate in the Swedish Botanical Society.

Department of Plants

Living Plants

Bates, Mr. Alfred, Newark, N. J., 14 varieties of *Hedera Helix*.

Bixby, Mr. Charles, Brooklyn, N. Y., 16 ferns and local plants.

Bobbink & Atkins, Rutherford, N. J., a total of 264 roses comprising 129 named varieties.

Brewster, Miss Minnie D., Brooklyn, 1 Jack-in-the-Pulpit.

Bristol Nurseries, Inc., Bristol, Conn, 66 plants of Chrysanthemums.

Brownell, Mr. Walter D., Brownell Research Gardens, Little Compton, Rhode Island, 10 roses.

Cole Nursery Co., Painesville, Ohio, 4 Fuchsia Riccartoni Scarlet Beauty.

Conard-Pyle Co., West Grove, Pa., 92 roses in 17 varieties.

Diddell, Mrs. W. D., Jacksonville, Fla., 6 *Selaginella ludoviciana*.

Dreer, Henry A., Philadelphia, Pa., 6 *Rosa* Mrs. Carrie Jacobs Bond; 30 herbaceous and greenhouse plants.

Florida Exhibit, N. Y. World's Fair material consisting of 19 woody plants.

Flowerfield Bulb Farm, Flowerfield, L. I., 2000 corms of six varieties of Gladiolus.

Hazen, Prof. T. E., Columbia University, 2 *Pontederia* sp.

Hevle, Miss Frances, New York City, 2 clumps *Pyxidanthera barbulata*.

Holland Bulb Industry, 630 Fifth Avenue, New York, N. Y., 6000 bulbs of 25 varieties of Tulip and Hyacinth.

Hyde, Mrs. Clarence R., Brooklyn, N. Y., 2 Burgundy roses.

Jackson & Perkins, Newark, N. J., 88 roses in 16 varieties.

Jun, Mr. Erwin, Vero Beach, Fla., 23 plants of *Tillandsia, Maxillaria.*
Kitchewan Nurseries, Kitchewan, N. Y., seedlings of three species of *Rhododendron*; 3 plants of *Davidia involucrata,* 1 *Enkianthus campanulatus.*
Levison, Mr. J. J., Sea Cliff, L. I., 2 Boxwoods 8 ft. × 6 ft × 5 ft.
McGovern, Mrs. Margaret F., Jackson Heights, N. Y., 2 varieties of *Hedera Helix.*
Moon, Mr. W. H., Moon Nurseries, Morrisville, N. J., 9 varieties of *Hibiscus.*
Native Gardens of Eastern Washington, Spokane, 45 native western American plants.
Pan American Society of Tropical Research, New Orleans, 2 unnamed Philippine seeds for trial growing.
Peirce, Prof. George J., Leland Stanford Jr. Univ., Cal., 3 Liverworts.
Pfafford, Mrs. F. H., Stonington, Conn., 12 bulbs of *Leucojum* sp.
Rockefeller, Mr. John D., Jr., New York City, 2 large orange plants and 1 large nectarine in tubs.
Smith, Dr. F. F., Bureau of Entomology, Belleville, Md., 1 *Acer japonicum Parsonsii.*
Tricker, William, Saddle River, N. J., 63 water lilies in 56 species.
Vestal & Son, Little Rock, Ark., 6 roses in 3 varieties.
Vick, Mr. Edward, Newark, N. J., 60 corms of *Cyclamen cilicicum.*
Vilkomerson, Miss Hilda, Brooklyn, N. Y., 3 species of native plants.
Wayside Gardens, Mentor, Ohio, 79 nursery plants in 25 species.
Whitney, Mr. L. A., Brooklyn, N. Y., 1 rose var.

Seed Packets

Brown, Mr. Roscoe C. E. (1)
Cranford, Miss Margaret (1)
Fleischer, Mr. Joseph (16)
Henning, Mr. Adolph (3)
Henning, Mr. William (1)
Loines, Miss Hilda (5)
Petrocelli, Mrs. J. (1)
Porsild, Dr. Morten (6)
Stumpp & Walter Co. (35)
Weston, Mr. T. A. (1)

Phanerogamic Herbarium

Cooke, Mr. Wm. B., 2 specimens of Eleocharis from Mt. Shasta.
Deam, Mr. C. C., 16 miscellaneous specimens.
Drushel, Dr. J. A., 104 specimens from Canada and the United States.
Gomez e Sousa, Mr. A. de F., 2 specimens of Euphorbia from Portuguese East Africa.
Hayden, Dr. Ada, 3 specimens from Iowa.
Johnston, Mr. Richard, 1 sack of *Pinus ponderosa* cones from New Mexico.
Kezer, Mr. James, 22 specimens from New Jersey.
Kittredge, Miss E. M., 67 specimens from Vermont.
Maheshwari, Dr. P., 1 fern specimen from India.

Merrill, Dr. E. D., 1 specimen of Eleocharis.
Purer, Miss Edith, 247 specimens collected in Alaska, Yukon Territory, Washington, Oregon, and California.
Richards, Mrs. E. H., 1 fern specimen from New Hampshire.
Topping, Mr. D. LeR., 2 specimens of *Asplenium Macraci* from Hawaii.
Wolf, W., O.S.B., 6 specimens collected in Alabama.
Young, Mr. W. J., 1 specimen of *Origanum vulgare*.

For the Department of Elementary Instruction

American Spice Trade Association, Two hundred booklets for use in classwork.
Boys and Girls Club, $50.00 for publishing the Children's Map of the Garden.
Butler, Mrs. Glentworth R., One prize cup competed for by the girls in the outdoor garden; one subscription to the Nature Magazine.
C & C Spice Company, Bottled samples of spices for use in classwork.
Commercial Museum of Philadelphia, One bombilla and samples of Chilean nitrate, chicle, and rosewood for use in classwork.
Corn Products Refining Company, Illustrated standard chart on Corn.
Crow, Miss Alice T., Two books for the children's garden house library.
Derringer, Mrs. Adelaide, One book for the children's clubroom library.
Dittman, Richard, One book for the children's clubroom library.
Gager, Mrs. C. Stuart, Two books for the children's clubroom library.
Garden Teachers Association, One prize cup competed for by the boys of the outdoor garden.
Goodman, Mr. and Mrs. Joseph, One cup, in memory of Bernard Goodman, competed for by the boys in the outdoor garden.
Kirk, Miss Isabel, One book for the children's garden house library.
New York University Class (Teaching of Elementary Science), Two books for the children's clubroom library.
Palmitier, Miss Edna A., Two books for the children's clubroom library.
Paulsen, Miss Gertrude M., Ninety-eight flower pots for greenhouse work; miscellaneous garden implements.
Perkins, Mrs. Charles E., $25.00 honorarium for children's garden work.
Pond, Miss P. F., Lichens from Norway for use in classwork.
Ridgway, Miss Beverly, $5.00 for the children's clubroom.
Shaw, Miss Ellen Eddy, Packets of seed from England; one gold honor pin for service in the outdoor garden.
Sherwin, Misses Gladys and Jean, Two books for the children's clubroom library.
Smalley, Mr. Melvin, $5.00 for the children's clubroom.
Tannenbaum, Mr. and Mrs., and Lawrence, $5.00 for the children's clubroom.
Weissberg, Master Joseph, One book for the children's clubroom library.

Note: Gifts of money from many sources have been added to the Children's Endowment Fund and are included in the total under the heading Ellen Eddy Shaw Endowment Fund.

Miscellaneous

Mr. H. Bernhey, Brooklyn, N. Y., 9 photographs (8 views in Brooklyn Botanic Garden and 1 view in Prospect Park).

Brooklyn Museum, Brooklyn, N. Y., 3 photographs of *Victoria regia* in flower.

Museum National d'Histoire Naturelle, Paris, France, 2 photographs of the "Robinier de Robin."

Miss Elizabeth Small, New York, N. Y., 1 bas relief of Mrs. John Torrey.

APPENDIX 2

PUBLICATIONS BY THE BOTANIC GARDEN PERSONNEL DURING 1939

Benedict, Ralph C.

Review of Cryptogamic Botany. *Science* **89**: 13–14. January.

Review of Southeastern Ferns. *Journal of New York Bot. Gard.* **40**: 48–49. February

Review of Cryptogamic Botany. *Torrey* **39**: 46. March–April.

Review of Haupt's An Introduction to Botany. *Torreya* **39**: 45. March–April.

Report of the Resident Investigator (Ferns) for 1938. *Brooklyn Bot. Gard. Record* **28**: 108–109. April.

Review of The First Experiment in Plant Physiology. *Science* **89**: 411–412. May.

The Study of Ferns as a Hobby. *Horticulture* **17**: 218. May.

Review of The Physiology of Plants. *Torreya* **39**: 80–81. May–June.

Review of General Plant Physiology. *Torreya* **39**: 81–82. May–June.

Growing Ferns from Spores. *American Fern Journal* **29**: 95–98. July–September.

Review of Methods and Materials for Teaching Biological Sciences. *Torreya* **39**: 140–141. September–October.

Review of Priestley and Scott's An Introduction to Botany. *Torreya* **39**: 141–142. September–October.

Bishop, George R.

A Colossal aquatic. *Gardeners' Chronicle of America* **43**: 37–38. February.

The Revival of knot gardening. *Gardeners' Chronicle of America* **43**: 145–146. May.

Flowering stones and windowed plants. *Gardeners' Chronicle of America* **43**: 362–363. December.

Caparn, Harold A.

Roses in the landscape. *Amer. Rose Annual* **24**: 129–131.

Cheney, R. H.

Microphysical changes induced in striated muscle after caffeine immersion. *Anat. Rec.* **73**: 129–143. February.

Caffeine effects upon the activity of the longitudinal muscles of the small intestine. *Jour. Amer. Pharmaceut.* **28**: 271–278. May.

Doney, Charles F.

For more interesting plantings. *Bull. Gard. Club Amer.* **1939**, no. 3 (ser. 7): 105. May.

Bladdernuts. *Gard. Chron. of America* **43**: 305. October.

Hollies. *Gard. Chron. of America* **43**: 368. December.

Free, Montague.

Wardian cases (Terraria to you). *Real Gardening* **1**: 5–15. January.

Plants grown as standards. *The Sun* (New York). January 28.

The Art of dormant spraying. *The Sun* (New York). February 25.

Tree pruning and fertilizing. *The Sun* (New York). March 25.

Hardy 'mums and asters. *The Sun* (New York). March 25.

Improving your soil. *The Sun* (New York). April 1.

Plant azaleas in the spring. *The Sun* (New York). April 22.

Report of the Horticulturist for 1938. *Brooklyn Bot. Gard. Record* **28**: 97–103. April.

Select evergreens carefully. *The Sun* (New York). May 6.

Fresh herbs from the garden. *The Sun* (New York). May 20.

After bulbs have flowered. *The Sun* (New York). June 3.
Perennials from seed. *The Sun* (New York). June 24.
Start your biennials now. *The Sun* (New York). July 8.
Beetle war on many fronts. *The Sun* (New York). July 22.
Broaden your interests. *Men's garden clubs of America. Year book* **1939**: 18–19. [July?]
Autumn flowering bulbs. *The Sun* (New York). August 5.
The Pruning of ornamental trees and shrubs. *Real Gardening* **2**: 33–42. September.
Rosy barks, ghostly branches. *The Sun* (New York). October 7.
Story of the tulip. *The Sun* (New York). October 21.
Herb and knot gardens. *Souvenir Book* of Gardens on Parade, New York World's Fair. p. 31, 35.
Why use Latin plant names? *National Seedman* **5**: 12–13. December.

Free, Montague, and H. K. Svenson

Alyssum scardicum (Cruciferae). *Saxiflora,* Plate 4. (Publication date December 31, 1938.)

Gager, C. Stuart

Review of Florence Bell Robinson's "Useful trees and shrubs." *Ecology* **20**: 96. January.
Review of William Seifriz's "The physiology of plants." *Ecology* **20**: 96–97. January.
Gardens within a garden. *Official Program, 26th International Flower Show.* P. 135. March 13.
Twenty-eighth annual report of the Brooklyn Botanic Garden: Report of the director. *Brooklyn Bot. Gard. Record* **28**: 9–47. April.
Review of Priestly and Scott's "An introduction to botany." *Ecology* **20**: 312–313. April.
Daniel Trembly MacDougal: Pioneer Plant Physiologist. (One of three tributes in recognition of the seventy-fifth birthday of Dr. MacDougal.) *Plant Physiology* **14**: 193–194. April.
Brooklyn Botanic Garden. *Souvenir Book* of Gardens on Parade, New York World's Fair, 1939. P. 170.

Brooklyn Botanic Garden. *New York Advancing.* World's Fair Edition. (Edited by Mayor F. H. LaGuardia.) P. 123–124. May.

"Distinction" in "Science." *Science* **90**: 209. Sept. 1.

Graves, Arthur Harmount

Breeding trees for disease resistance. *Proceedings of Eastern Shade Tree Conference for 1938.* Pp. 95–99. Feb.

Guide to Eastern Ferns. (Review) *Torreya* **39**: 14. Feb.

The development of blight resistance in hybrid chestnuts. Report of the 29th annual meeting of the Northern Nut Growers Association, Sept. 12–13, 1938. Pp. 31–35. March.

Botany. Revision service (for 1938). *Collier's National Encyclopedia.* March.

Horticulture. Revision service (for 1938). *Collier's National Encyclopedia.* March.

Report of the Curator of Public Instruction for 1938. *Brooklyn Bot. Gard. Record* **28**: 66–76. April.

Chestnut breeding work in 1938. *Brooklyn Bot. Gard. Record* **28**: 54–60. April.

The doctrine of signatures. *The Biologist.* (Publication of the Alexander Hamilton (H. S.) Biological Society) **5**: 11, 12. Spring Issue.

Maples of New York and vicinity. *School Nature League Bulletin* Series 9, No. 9. May.

Care of cut flowers. *Real Gardening* 2^3: 51–58. July.

New chestnuts for old. *Real Gardening* 2^7: 55–60. November.

38 newspaper articles about the Brooklyn Botanic Garden.

Gundersen, Alfred

Report of the Curator of Plants for the year 1938. *Brooklyn Bot. Gard. Record* **28**: 60–63; 86–89. April.

Flower buds and the phylogeny of dicotyledons. *Bull. Torrey Club* **66**: 287–295. May. Reprinted as *Brooklyn Bot. Gard. Contrib. no. 87.*

Classification of dicotyledons. *Torreya* **39**: 108–111. July–August.

Jordan, William E.

Report on the Library for 1938. *Brooklyn Bot. Gard. Record* **28**: 104–108. April.

Miner, Frances M.

Children need a chance. (For the School Garden Association of America.) *Garden Digest*. July–August.

Reed, George M.

Plant Pathology. *Brooklyn Bot. Gard. Record* **28**: 47–51. April.

The Iris. *Brooklyn Bot. Gard. Record* **28**: 51–53. April.

Report on the Mycological Herbarium, 1938. *Brooklyn Bot. Gard. Record* **28**: 94–96. April.

Botany. *The New International Year Book* **1938**: 98–100. Funk & Wagnalls Co. April.

Farmingdale Iris Garden. *Amer. Iris Soc. Bull.* **74**: 20–22. July.

The fall planting of iris. *The Sun* (New York). Sept. 16.

Shaw, Ellen Eddy

The following 11 articles appeared in *The Sun* (New York) on the dates indicated:

Novelties for the 1939 garden. January 21.

More novelties for the seed list. January 28.

Flowering cabbage, a novelty for the 1939 garden. February 4.

Vegetable introductions for 1939. February 11.

Zinnias. February 18.

Dianthus. February 25.

The newer marigolds. March 4.

Indoor planting of seed for the outdoor garden. March 11.

Raising relishes. March 18.

Lessons from English gardens. November 11.

English rock gardens. November 25.

Svenson, Henry K.

Monographic studies in the genus Eleocharis—V. *Rhodora* **41**: 1–19, 43–77, 90–110. 11 plates, 72 maps. January, February, March. (Reprinted as *Brooklyn Botanic Garden Contributions* No. 85.)

The asterisk in Linnaeus's Species Plantarum. *Rhodora* **41**: 139–140. April.

Review of "The role of plant life in the history of Dutchess County," by E. A. Roberts and H. W. Reynolds. *Landscape Architecture* **39**: 147. April.

Erechtites megalocarpa on Long Island. *Rhodora* **41**: 256. June.

Dates of Boeckeler's Cyperaceae. *Rhodora* **41**: 313. July.

Corynephorus canescens on western Long Island. *Rhodora* **41**: 314. July.

Cyperaceae of the Templeton Crocker Expedition. *Calif. Acad. Sci. Proc.*, Ser. 4, **22**: 187–193. July. (Reprinted as *Brooklyn Botanic Garden Contributions* No. 88.)

Quercus rubra once more. *Rhodora* **41**: 521–524. November.

A new Chinese Eleocharis. *Rhodora* **41**: 559. November. [*E. yunnanensis*.]

Tilley, S. R.

Rose traditions. *American Rose Society Annual*. Pp. 13–15.

Total number of publications: 17 technical; 77 popular and semi-popular.

APPENDIX 3

TALKS, LECTURES, ADDRESSES, AND PAPERS GIVEN BY THE BOTANIC GARDEN PERSONNEL DURING 1939

By the Director:

April 18. *Presentation to Miss Mary R. Mackey* (of gift from 23 Garden Clubs organized by her as Director of the Garden Department of the Plant, Flower, and Fruit Guild). Salisbury Country Club, Westbury, Long Island.

April 19. *The significance of the Dean C. Osborne Memorial.* Brooklyn Botanic Garden.

May 8. *The four botanic gardens of Brooklyn.* Long Island Historical Society, Brooklyn.

December 28. *Brooklyn Botanic Garden's cooperation with public schools.* American Science Teachers Association, Columbus, Ohio.

By the Curator of Public Instruction:

January 19. *Making a new chestnut tree.* Pennsylvania Nut Growers' Association. Harrisburg, Pa.
January 21. *Breeding the chestnut.* Students at New York University, Washington Square College.
March 15. *The Brooklyn Botanic Garden.* The Institute at the Academy of Music. Brooklyn.
April 21. *Breeding the chestnut.* Biology Class, Jamaica H. S.
April 26. *Variation and evolution in plants.* Microscopy Club, New Utrecht H. S.
April 28. *European parks and gardens.* The Fortnightly Club. At the Garden.
May 19. *Plant conservation and forestry.* Seward Park H. S.
May 19. *Address of welcome.* Torrey Botanical Club 3-day field meeting, Branchville, N. J.
May 27. *Conservation and forestry.* Abraham Lincoln H. S. At the Garden.
October 24. *The work of the Brooklyn Botanic Garden.* New Milford Garden Club, New Milford, Conn.
November 22. *Breeding the chestnut.* Biology Department, Departmental Meeting, Abraham Lincoln H. S.

By the Curator of Elementary Instruction:

January 7. *Testimonial address to Miss Regina C. M. Burke, Associate Superintendent.* Reception in honor of Miss Burke. Waldorf-Astoria.
January 18. *Garden work for children.* Parent-Teachers' Association, P. S. 170, Queens.
January 21. *The Brooklyn Botanic Garden in education.* Brooklyn Assistants to Principal Luncheon. Waldorf-Astoria.
January 24. *Graduation address.* P. S. 401.
January 25. *Graduation address.* P. S. 241.
January 27. *Graduation address.* P. S. 20, Richmond.

February 7. *The educational value of children's gardening.* Parent-Teachers Association, P. S. 101, Queens.

March 1. *Spring nature study.* P. S. 118.

March 4. *Educational activities of the Brooklyn Botanic Garden.* Beta Pi Chapter, Kappa Delta Pi. At New York University.

March 6. *Growing successes.* Albert G. de Quevedo Guild of Brooklyn. At Columbus Club.

March 7. *Educational work at the Brooklyn Botanic Garden.* Vassar Club of New York.

March 10. *The Brooklyn Botanic Garden.* Two assemblies, Girls' High School.

March 13. *Gardening for children.* Garden Club of Morristown, N. J.

March 16. *The Brooklyn Botanic Garden.* High School of Music and Art.

March 22. *Why children should garden.* Brooklyn Institute of Arts and Sciences.

July 16. *Children's gardens.* School of Horticulture, Swanley, England.

October 13. *The Brooklyn Botanic Garden.* Two assemblies, P. S. 131.

October 20. *The Brooklyn Botanic Garden.* Bay Ridge High School.

October 23. *Gardens of England.* New York Chapter, American Nature Study Society. At the Garden.

November 6. *Children's gardens.* Flower Show Dinner of Long Island Garden Clubs and Nassau County Horticultural Society, Glen Cove, L. I.

November 15. *Beverage plants.* P. S. 155, Queens.

November 15. *The Brooklyn Botanic Garden.* P. S. 96, Queens.

November 20. *Thanksgiving traditions.* Girls' Commercial High School.

December 2. *English gardens.* Alumnae Association of Tufts College. At Hotel White.

December 4. *Christmas greens and fables.* Mothers' Club, P. S. 241.

December 8. *The Brooklyn Botanic Garden.* P. S. 193.
December 11. *Christmas customs.* Parents Association, Wilde Open Air School.
December 18. *House plants.* Red Cross Unit, First Presbyterian Church.
December 30. *President's address.* American Nature Study Society Meeting, Columbus, Ohio.

By the Curator of Plants:

April 16. *Evergreens.* Woodmere Garden Club. At the Garden.
April 22. *Astronomy with an opera glass.* Brooklyn Institute Dept. Astronomy. At the Academy of Music.

By the Curator of the Herbarium:

October 18. *Flowers of Middle Tennessee.* Torrey Botanical Club.
December 28. *Descriptive method of Linnaeus's Species Plantarum.* Section on Taxonomy, American Association for the Advancement of Science. Columbus, Ohio.

By the Horticulturist:

January 16. *Gardening.* Springfield (Mass.) Garden Club.
February 22. *The Romance of plant life.* James River (Va.) Garden Club.
March 6. *Less familiar plants.* Passaic Valley (N. J.) Garden Club.
April 17. *The Romantic potato.* Wilde School, Brooklyn.
May 12. *Clematis.* Garden Club of Allegheny, Pittsburgh, Pa.
July 18. *The Romance of plant life.* Shippan Point (Conn.) Garden Club.
July 25. *The Romance of plant life.* Connecticut State College, Storrs, Conn.
October 5. *Making the Brooklyn Botanic Garden Rose Garden.* At the Garden.

By the Librarian:

April 21. *The Brooklyn Botanic Garden Library.* Members of Pratt Institute School of Library Science Class. At the Garden.

By the Assistant Curator of Elementary Instruction:

July 24. *Continuity of bloom and color harmony in the garden.* Garden Club of Westhampton Beach.

September 30. *Educational work at the Brooklyn Botanic Garden.* Class in the Teaching of Elementary Science from New York University. At the Garden.

October 11. *House plants.* Poughkeepsie Garden Club.

November 20. *Fall and winter operations in the garden.* Bay Ridge Garden Club.

November 27. *Fall and winter operations in the garden.* Flushing Garden Club.

By the Resident Investigator (Ferns):

February 11. *Living Fern Collections.* American Fern Society meeting, Brooklyn Botanic Garden.

July 24. *Botanic Gardens.* Glens Falls (New York) Garden Club.

August 19. *The Status of Plant Conservation.* Conservation conference. Huddle Bay, Bolton, New York.

By the Resident Investigator (Economic Plants):

May 4. *The Biological Basis of Democracy.* Annual Oration before the "Optimates Society," the scholastic honor society at Long Island University, College of Arts and Sciences, 300 Pearl Street, Brooklyn.

June 8. *Modern Use of Common Medicinal and Culinary Herbs.* The Brooklyn Nature Club at the Brooklyn Botanic Garden.

November 3. *Effects of Caffeine Plants upon Human Physiology.* The American Institute of the City of New York, 60 East 42nd Street, New York City.

December 1. *Botanical Research at the Marine Biological Laboratory and the Oceanographic Institution at Woods Hole, Mass.* Anaphy (Honorary Biology Society), Long Island University.

By Instructors:

Miss Carroll:

May 4. *The Brooklyn Botanic Garden.* Parent-Teachers' Association, P. S. 170 Queens. At the Garden.

November 6. *Educational work with children at the Brooklyn Botanic Garden.* Kindergarten Mothers Club, P. S. 233.

Miss Hammond:

January 4. *Preparations for gardening.* Mothers Club, P. S. 134, Queens.

March 14. *Everyday adventures in nature.* Parent-Teacher Association, Chatsworth Avenue School, Larchmont, N. Y.

April 24. *Birds.* Brooklyn Section, P. S. Kindergarten Association. At the Garden.

April 27. *Symposium on nature adventures.* New York Chapter, American Nature Study Society. At the American Museum of Natural History.

May 10. *The Brooklyn Botanic Garden.* Mothers Club, P. S. 113. At the Garden.

May 31. *Birds and their ways.* P. S. 109.

September 20. *Making and caring for a terrarium.* Flower Show of the Bay Ridge Garden Club.

Miss Miner:

January 4. *Plants for a school garden.* P. S. 157.

January 20. *Gardening for children.* Conference, Garden Club Federation of Maine, Portland, Maine.

January 20. *Plans for a program with children.* Meeting of Junior Chairmen, Garden Club Federation of Maine, Portland, Maine.

January 21. *Starting a garden with boys and girls.* Conference, Garden Club Federation of Maine, Portland, Maine.

March 10. *Children's gardens and their place in the community program.* Sixth Annual Outdoor Recreation Conference. At Massachusetts State College, Amherst, Mass.

March 23. *Soil Management.* New York Chapter, American Nature Study Society. At the American Museum of Natural History.

April 12. *Children's educational work at the Brooklyn Botanic Garden.* Fort Greene Chapter, D. A. R. At the Garden.

May 16. *The children's garden at the Brooklyn Botanic Garden.* Neighborhood Garden Guild of Glen Cove, L. I.

June 16. *A flower garden.* P. S. 182.

June 22. *Flowers in fact and fancy.* Business and Professional Women's Club, Riverside Church.

July 12. *The children's garden at the Brooklyn Botanic Garden.* Garden Club of Stonington, Conn.

October 13. *The children's garden at the Brooklyn Botanic Garden.* Twenty-fourth National Recreation Congress, Boston, Mass.

October 26. *Making a garden.* Garden Class, P. S. 12.

November 15. *The children's garden at the Brooklyn Botanic Garden.* Garden Club of Ohio. Conference at Cleveland.

November 15. *Children and gardens.* Garden Club of Ohio. Conference at Cleveland.

November 16. *The children's garden at the Brooklyn Botanic Garden.* Benjamin Franklin Elementary School, Cleveland, Ohio.

Miss Rusk:

February 27. *Plant Propagation.* Class from Girls Commercial High School. At the Garden.

April 19. *Spring Wild Flowers.* Curtis High School.

April 20. *Variation and Evolution.* Class from Girls High School. At the Garden.

April 25. *Plant Breeding.* The Bronx High School of Science.

May 8. *Brooklyn Botanic Garden.* Class from St. Agnes. At the Garden.

July 18. *Wild Flowers of the Woods.* Summer Garden Institute at Rogers Rock, N. Y.

July 19. *Our Common Native Trees.* Summer Garden Institute at Rogers Rock, N. Y.

July 20. *Wild Flowers of the Fields.* Summer Garden Institute at Rogers Rock, N. Y.

July 21. *Our Native Ferns.* Summer Garden Institute at Rogers Rock, N. Y.
October 18. *Fall Wild Flowers.* Jr. H. S. 52, the Bronx.
October 27. *Evolution.* Class from Gardner School. At the Garden.
December 13. *Common Food Plants.* Jr. H. S. 52, the Bronx.

By Research Assistants:

Dr. Marcy:

February 15. *Infection experiments with sorghum smuts.* Torrey Botanical Club. At the Garden.

Dr. Utter:

March 6. *Races of the oat smuts and their hybridization.* Biology Club, Hunter College. New York City.

By the Assistant in Woody Plants:

March 29. *Unusual and interesting shrubs.* Brooklyn Institute. At the Academy of Music.
April 25. *The Brooklyn Botanic Garden.* At the Bedford Presbyterian Church.
October 26. *Fruiting shrubs.* Brooklyn Nature Club. At the Children's Museum.

By Curatorial Assistant (Hilda Vilkomerson):

February 17. *Vegetative Plant Propagation.* Girls' Commercial High School. At the Garden.
May 6. *The Brooklyn Botanic Garden.* Richmond Hill High School.
May 10. *Variation and Evolution.* Manual Training High School. At the Garden.
October 4. *Soil conservation.* Brooklyn College.
October 21. *The work of the Brooklyn Botanic Garden.* Bay Ridge High School Biology Club. At the Garden.
November 15. *Garden Flowers.* Jr. High School 52, Bronx.

By the Custodian:

November 16. *Ecology.* Brooklyn Nature Club. Children's Museum, Brooklyn.

By the Foreman Gardener (George R. Bishop):

May 20. *Gardens within the range of occupational therapists.* Presbyterian Hospital, New York.

October 2. *Trees and shrubs.* Maplewood (N. J.) Garden Club.

By the Gardener in Charge of the Rose Garden (S. R. Tilley):

October 5. *Roses and the weather.* American Rose Society Meeting. Brooklyn.

Total number of talks, 123. Attendance, 21,380.

APPENDIX 4

RADIO TALKS BY THE BOTANIC GARDEN PERSONNEL DURING 1939

By the Curator of Public Instruction:

From Station WNYC:

January 12. New developments in plant science during 1938.
April 20. Spring flowers at the Brooklyn Botanic Garden.
May 18. What to see now at the Brooklyn Botanic Garden.
November 8. New chestnuts for old.

By the Curator of Elementary Instruction:

From Station WNYC:

January 26. Choosing seed for the 1939 garden.

By the Horticulturist:

From Station WOR:

January 9. January garden chores.
January 30. Answer me this.
February 13. Answer me this (Part 2).
February 17. What's in a name?
March 17. March garden chores.
June 24. June jobs.
July 21. Delphiniums.
August 14. Autumn blooming bulbs.

September 29. 'Mums.
October 27. Let's plant lilacs now.
December 29. The Story of boxwood.

From Station WNYC:

March 23. Easter flowers.
June 29. The Gardener takes a vacation.

From Station WMCA:

March 14. The International Flower Show.

By the Assistant in Woody Plants:

From Station WNYC:

February 9. Shrubs for bloom throughout the year.
March 9. The handsome Magnolias.
June 1. Your garden in the summer.
October 25. The pine trees.
December 6. The hollies.

From Station WOR:

April 7. Flowers of the Bible.
May 22. Familiar evergreens: cypresses.
November 27. Along the roadside: shrubs.

By Instructors:

(Miss Carroll)

From Station WNYC:

April 6. Color in the garden.
December 6. Plants in Christmas decoration.

From Station WWNC (Asheville, N. C.):

August 10. The beauty of everyday life as viewed from nature.

(Miss Hammond)

From Station WNYC:

May 4. Nature study with children.

(Miss Miner)

From Station WNYC:

June 15. A child's garden.

By the Curator of the Herbarium:

From Station WNYC:

February 23. Botanic Gardens.

November 22. The cultivation of native plants.

Total number of broadcasts, 34.

APPENDIX 5

FIELD TRIPS CONDUCTED, 1939

By the Curator of Plants:

July 27–29. Torrey Botanical Club. Botany and Geology of the Catskills in Ulster and Greene Counties.

October 21. Torrey Botanical Club. Species of Pine. At the Garden.

By the Curator of the Herbarium:

June 18. Torrey Botanical Club. Freehold, New Jersey.

By Instructor (Hester M. Rusk):

July 18. Summer Garden Institute at Rogers Rock, N. Y. Club grounds, Rogers Rock.

July 19. Summer Garden Institute at Rogers Rock, N. Y. Fort Ticonderoga, N. Y.

July 20. Summer Garden Institute at Rogers Rock, N. Y. Club grounds, Rogers Rock.

July 21. Summer Garden Institute at Rogers Rock, N. Y. Memorial Fern Garden on Club grounds, Rogers Rock.

July 22. Summer Garden Institute at Rogers Rock, N. Y. Bog near Lake George, N. Y.

By Curatorial Assistant (Hilda Vilkomerson):

March 26. Torrey Botanical Club. Franklin Lake, New Jersey.

May 6. Torrey Botanical Club. Inwood, Spuyten Duyvil, and Marble Hill, New York.

November 19. Torrey Botanical Club. Windbeam and the Pine Paddies, Wanaque, New Jersey.

By the Custodian:

May 29. Chinkchewunska Chapter D. A. R., Herons Nest, Sussex Co., New Jersey.
June 8. Brooklyn Nature Club. Brooklyn Botanic Garden.

By the Curator of Public Instruction:

May 20. Branchville Nature Conference & Torrey Botanical Club. Branchville, N. J.

Total number of field trips conducted, 14.

APPENDIX 6

ORGANIZATIONS MEETING AT THE GARDEN, 1939

January 17. Long Island Horticultural Society.
February 11. American Fern Society.
February 15. Torrey Botanical Club.
February 25. School Art League.
April 12. Fort Greene Chapter N. S. D. A. R.
April 17. Woodmere Garden Club.
April 17. Monday Culture Charity Club.
April 19. Woman's Auxiliary, Brooklyn Botanic Garden.
April 20. Reconciliation Tours, Inc.
April 21. Pratt Institute Library School.
April 24. Brooklyn Section Public School Kindergarten Association.
April 28. Fortnightly Library Club.
May 1. Mothers' Club, P. S. 140, Brooklyn.
May 3. Women of '76 Chapter N. S. D. A. R.
May 4. Elizabeth (New Jersey) Woman's Club.
May 4. Mothers' Club, P. S. 225.
May 4. Parent Teachers Association, P. S. 170, Brooklyn.
May 7. Reconciliation Tours, Inc.
May 10. Adult Education Group of New York City.
May 10. Parents Association, P. S. 113, Brooklyn.
May 10. Brooklyn Assistants to Principals.
May 11. Contemporary Club of Brooklyn.
May 11. American Nature Study Society.
May 15. Garden Club of Bay Ridge.

May 18. Assistants to Principals, Queens.
June 5. Brooklyn Section New York P. S. Kindergarten Association.
June 8. Brooklyn Nature Club.
June 23. North Country Community Association.
July 30. Reconciliation Tours, Inc.
October 3. Torrey Botanical Club.
October 5. American Rose Society.
October 6. American Rose Society.
October 19. Department of Botany, Brooklyn Institute of Arts and Sciences.
October 21. Torrey Botanical Club.
October 23. American Nature Study Society, New York Branch.
35 Organizations. Total attendance, 1,982.

APPENDIX 7

REPORT OF PHOTOGRAPHIC WORK

Negatives on file December 31, 1938		9,750
Negatives accessioned during 1939		150
Total negatives on file December 31, 1939		9,900
Lantern slides on file December 31, 1938		6,812
Lantern slides accessioned during 1939		27
Total lantern slides on file December 31, 1939		6,839
Prints on file December 31, 1938		9,750
Prints made during 1939	1,077	
Used or distributed	927	
Prints filed during 1939		150
Total prints on file December 31, 1939		9,900
Enlargements made		71
Motion pictures made (in technicolor)		4 reels

Note.—All photographic work is by Mr. Louis Buhle, staff photographer, and all halftone reproductions in Brooklyn Botanic Garden publications are from photographs by Mr. Buhle unless otherwise designated.

In addition to the work reported above statistically, our photographic department has made several motion picture reels, numerous kodachrome views, and 4 enlargements, 32 inches by 42 inches, in connection with our World's Fair exhibits.

During July Mr. Buhle, as photographer, accompanied Dr. Svenson in botanical field work in middle Tennessee.

APPENDIX 8

REPORT ON BROOKLYN BOTANIC GARDEN PUBLICATIONS, 1939

Ecology

Official Organ of the Ecological Society of America. Quarterly. Volume XX comprised 39 papers (besides reviews, proceedings, and miscellaneous matter), 602 pages and 152 text figures (as against 36 papers, 607 pages, and 119 text figures in 1938). The circulation at the close of the fiscal year (November 30, 1939) was 1,226 as against 1,069 one year ago.

The annual budget was $6,107.75, the credit balance $1,861.01, and assets over liabilities $1,051.16 (as against $4,503.54, $613.10 and $125.93 assets over liabilities in 1938), plus the value of back sets and volumes on hand. Dr. Henry K. Svenson continued on the editorial board as the Brooklyn Botanic Garden representative. Prof. Alfred E. Emerson and Prof. George D. Fuller, both of the University of Chicago, continued as Editors.

Genetics

In Cooperation with "Genetics, Incorporated" Bimonthly. Volume XXIV comprised 47 papers, 844 pages, 8 plates and 223 text figures (as against 37 papers, 656 pages, 7 plates, and 181 text figures in 1938). At the close of the fiscal year (November 30, 1939) the circulation was 777, the annual budget $5,205.06, and the credit balance $2,857.57 (as against 765, $9,856.56, and $3,091.68 in 1938), plus the value of back sets and volumes on hand. Dr. L. C. Dunn, of Columbia University, continued as Managing Editor.

Brooklyn Botanic Garden Record

Quarterly. Volume XXVIII comprised 241 pages. The April number comprised the Annual Report. The circulation of the Record at the close of the year was 1,441.

Leaflets

One double number was issued. The circulation at the close of the year was 1,540.

Contributions and Memoirs

Numbers 81, 85, 87, and 88 of the *Contributions* were published. No *Memoir* was published.

APPENDIX 9

AGREEMENT BETWEEN GENETICS, INCORPORATED, AND BROOKLYN BOTANIC GARDEN CONCERNING THE PUBLICATION OF THE JOURNAL "GENETICS"

Whereas on May 10, 1939, the corporation GENETICS, INCORPORATED, became the successor of the former "Editorial Board of *Genetics*," and

Whereas GENETICS, INCORPORATED desires to continue the cooperation of Brooklyn Botanic Garden in the publication of the journal *Genetics,* and

Whereas Brooklyn Botanic Garden desires to cooperate with GENETICS, INCORPORATED, in the publication of the journal *Genetics,* it is therefore mutually agreed as follows:

1. For the present, and until further agreement otherwise, the period of issue shall be bi-monthly and the total number of pages per volume of six numbers shall not exceed 700, more or less.

2. GENETICS, INCORPORATED, agrees to assume all responsibility for securing and editing copy, for forwarding the same regularly and promptly to the printers, for the reading and prompt return of proof, and for all other editorial matters.

3. At or near the bottom of the front page of the cover of the journal, and elsewhere, as may subsequently be agreed upon, shall appear the following statement of publication:

Published by the
Brooklyn Botanic Garden
at
(Address of the printers)

4. The Business Manager of the Journal shall be the Brooklyn Botanic Garden, or such officer or member of the Botanic Garden staff as the Director may from time to time designate.

5. Advertisements may be carried on special pages inserted after the scientific articles, and not elsewhere except by mutual agreement. All the cover pages shall, for the present and until mutually agreed otherwise, be reserved for announcements relating to *Genetics*. The advertisements shall be of a character acceptable to both the Editorial Board and the Botanic Garden.

6. No charge is to be made to GENETICS, INCORPORATED, for the storage of undistributed copies of the journal at the Brooklyn Botanic Garden, but if it becomes necessary to pay rental or insurance for storage accommodations outside the Botanic Garden buildings, such rental or insurance shall become a charge against the account of the journal.

7. All publications received in exchange for the journal, except editorial exchanges, shall be deposited in the library of the Brooklyn Botanic Garden, and shall become the permanent property of the Garden, and shall become subject to the regulations governing the administration of the library.

8. If, and whenever, at any time, the gross income of the journal, from all sources (including subscriptions, advertisements, the sale of back numbers and sets, and any subsidies or endowments), shall exceed the necessary expenses of publication, postage, stationery, business office assistance, etc., the surplus, either as principal or as interest on the same, shall be applied to improving the journal, either by increasing the number of pages, or the number or quality of the illustrations, or the quality of the paper, one or all, or in any other way, according as the editors and management may jointly agree.

9. Three free copies of *Genetics* shall, if requested, be forwarded to the Managing Editor, but no other free copies shall be issued, except on the basis of exchange.

10. The fiscal year of the journal shall end on November 30, and the Business Manager shall render an annual financial report to GENETICS, INCORPORATED.

11. The choice of printer, and the drawing of all contracts for printing and illustrating shall rest with the business management,

and the Business Manager or publisher shall not be liable for any expenses incurred in the name of, nor on behalf of, the journal except by, or with the approval of, the Business Manager.

12. It is understood that no change shall be made in the physical qualities, paper stock, make-up, or quality of illustrations without mutual agreement.

13. No copyright shall be placed on the title "Genetics," nor on any of the contents of any issue, except by mutual agreement.

14. The Secretary-Treasurer shall present at each annual meeting of the members of the Corporation a statement showing receipts and expenditures, and assets and liabilities of the Corporation, such statement to be properly audited.

15. In case, and when, this agreement shall terminate the Brooklyn Botanic Garden shall retain ownership of the exchanges already received, and of such numbers of incomplete volumes of exchanges as are necessary to complete current volumes; but GENETICS, INCORPORATED, shall have possession of the mailing lists, of all overcopies of *Genetics,* and shall have the exclusive right to the name of the journal.

16. This agreement shall remain in force for not less than three years from June 1, 1939, and may be terminated by either party only after written notice of intention to terminate shall have been given to the proper official at least one year in advance.

For GENETICS, INCORPORATED:

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BROOKLYN, N. Y.,
June 2, 1939.

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(Revised to March 29, 1940)

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Contributing Membership, $100 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9–6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Free to members of the Garden. To others $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Papers:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 papers on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 85. Monographic studies in the Genus Eleocharis. V. 110 pages. 1939.

No. 86. The emergence of smut-inoculated oat seedlings through sand and loam soil. 7 pages. 1938.

No. 87. Flower buds and phylogeny of Dicotyledons. 9 pages. 1939.

No. 88. The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 37. The Cyperaceae. 7 pages. 1939.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. Price, 50 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

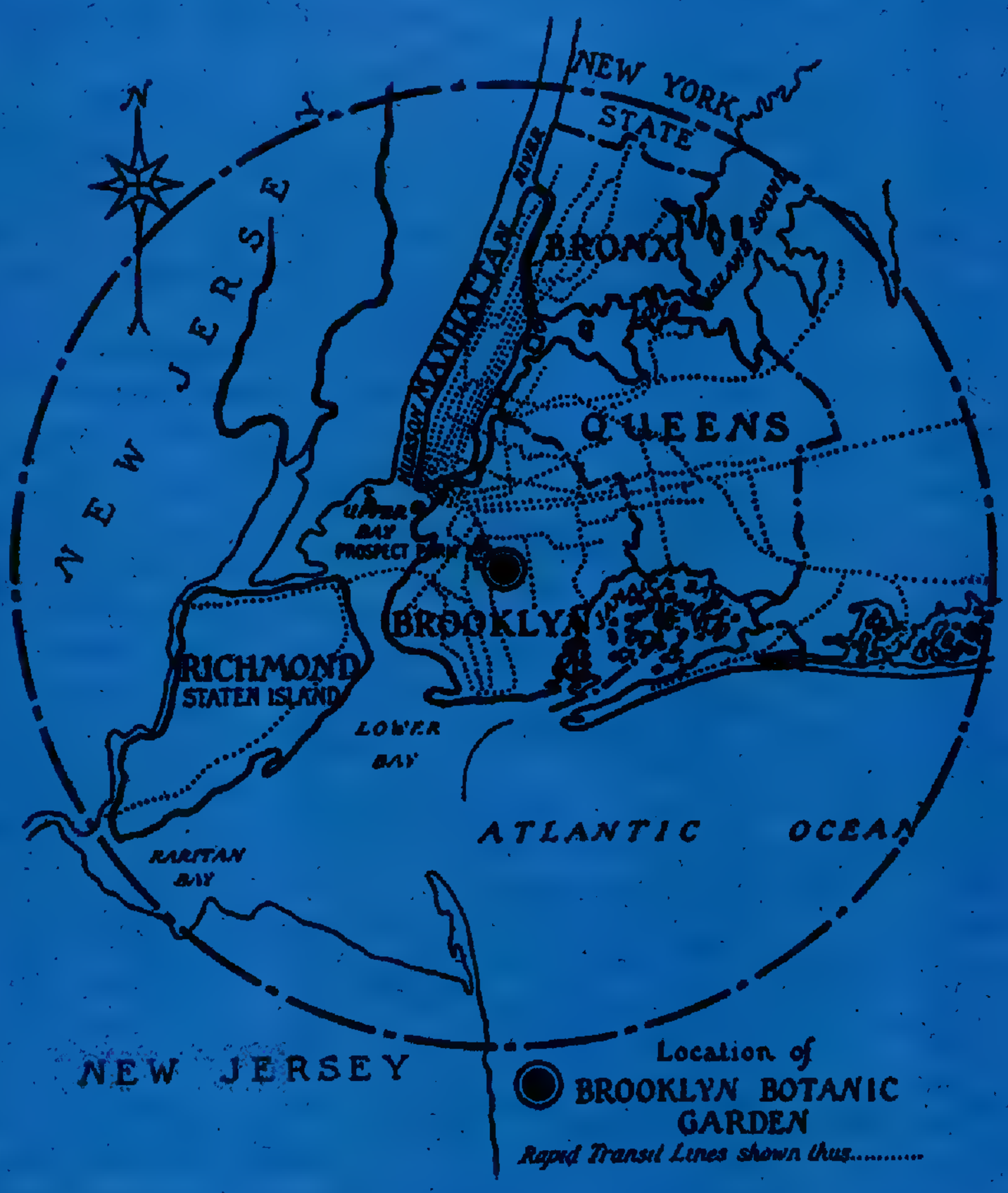
VOL. XXIX JULY, 1940 NO. 3

GARDENS WITHIN A GARDEN

A GENERAL GUIDE TO THE GROUNDS OF THE BROOKLYN BOTANIC GARDEN

SECOND EDITION

GUIDE NO. 10



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BROOKLYN, N. Y.

BROOKLYN BOTANIC GARDEN

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[1] Resigned as of May 31, 1940.

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FIG. 1. Airplane view of Brooklyn Botanic Garden. (Photo by Fairchild Aerial Surveys, Inc.) (10058)

BROOKLYN BOTANIC GARDEN RECORD

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GARDENS WITHIN A GARDEN [1]

A GENERAL GUIDE TO THE GROUNDS OF THE BROOKLYN BOTANIC GARDEN [2]

SECOND EDITION

BY C. STUART GAGER, *Director* [3]

INTRODUCTION

"Gardens within a Garden" tersely and appropriately describes the Brooklyn Botanic Garden, and in fact many botanic gardens, for such institutions commonly comprise, not one planting unit, but several. Possibly it is the realization of this which makes it (apparently) so natural for people to refer to a botanic garden as "botanic gardens." It has always seemed natural for people to use the plural form, "gardens," when referring to a public garden, even though it has unity of design (*e.g.*, Magnolia Gardens). When the garden of Epicurus became a public garden in Athens (270 B. C.), it was popularly known as the "Gardens of Epicurus" (Κῆποι Επικούρου). In the case of the Royal Botanic Gardens at Kew, near London, the plantations comprise two distinct

[1] This title was the happy suggestion of Mrs. Franklin Jones for a talk to be given by the writer before the Garden Club of New Rochelle, in October, 1928.

[2] *Docentry.* To assist members and others in studying the collections the services of a docent (teaching guide) may be obtained. This service is *free of charge to members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements may be made in advance by application to the Curator of Public Instruction. No parties of less than six adults will be conducted. Application may be made by mail or by telephone (Main 2–4433).

[3] With the collaboration of members of the Botanic Garden staff.

gardens which were united to form the grounds of the present institution, hence the plural form is both official and actual.

The use of "botanic" or "botanical" is a matter of arbitrary choice on the part of the institution.

Botanic Garden versus Park

The term "botanic garden" has been used for centuries, and is still used to designate a garden area planted in accordance with botanical considerations. Such botanic gardens are not uncommon as adjuncts of the botanical departments of colleges and universities, or as special features in a public park.

A modern botanic garden, however, considered as a separate organization, is more than a garden or gardens. It is a scientific and educational institution which usually comprises two or more of the following features: Plantations, Conservatories, Herbarium, Library, Laboratories, Class Rooms and Lecture Rooms, and an indoor Botanical Museum. We specially say "indoor" museum, because the plantations of a botanic garden are to be considered as an outdoor museum, the exhibits in which are living plants, arranged on some botanical basis, and labelled. It is this which fundamentally differentiates a botanic garden from a park, in which plants are arranged for landscape effect, with little or no regard for their botanical relationship. Another distinction between a botanic garden and a park is that a park is intended primarily for recreation, whereas, if the grounds of a botanic garden are large enough to possess park features, they are nevertheless not intended primarily for recreation but for education, and all regulations and restrictions governing their use by the public are based on that fact.

Automobiles

As a rule, automobiles are not admitted to the grounds of the Brooklyn Botanic Garden. Their exclusion adds materially to the charm of the Garden, and contributes to the safety and comfort of visitors.

Special permits admitting automobiles are issued *to members and contributors only* for the purpose of enabling aged or infirm persons or convalescents to enjoy the grounds. *In each case a*

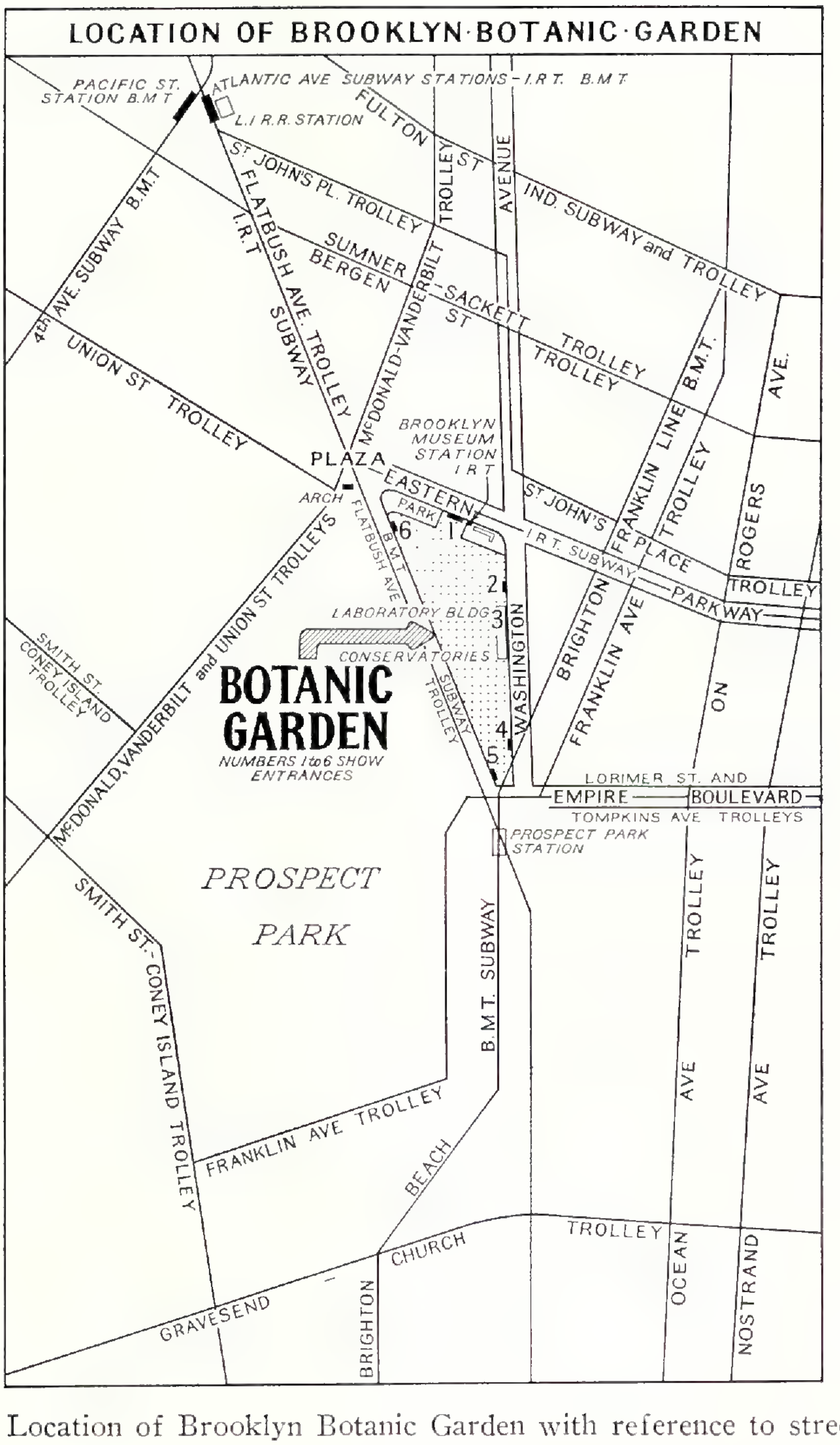


FIG. 2. Location of Brooklyn Botanic Garden with reference to streets and transit lines.

botanic garden guide must accompany the automobile to insure freedom from police interference, and also to act as a guide to the driver. The guide will also serve as docent. For such services there is no charge. Arrangements must be made in advance, preferably a day or two before the contemplated visit.

Leaving and Returning to Automobiles

Visitors coming by motor car for a walk about the grounds may arrange to return to the car at the same gate by which they enter; or, arrangements may be made to meet the driver at any other gate agreed upon, thus avoiding a long walk across the Garden after the object of the visit has been accomplished. The various possibilities as to entrance and exit will become evident on consulting the folded map.

Map of the Grounds

Visitors coming to view some special exhibit or section of the grounds should consult the folded map at the back of this Guide to ascertain the nearest entrance. Separate copies of the map are for sale at the Information desk at five cents each.

Entrances and Exits

There are six public entrances and exits to the Brooklyn Botanic Garden as follows:

On the North

1. Eastern Parkway
   Between Brooklyn Museum and Mt. Prospect Park

On the East

2. Washington Ave., North Gate
   South of Eastern Parkway and north of the Laboratory Building
3. Laboratory Building
   1000 Washington Ave., south of entrance No. 2
4. Washington Ave., South Gate
   North of Empire Boulevard

On the West

5. Flatbush Ave., South Gate
   Near Empire Boulevard
6. Flatbush Ave., North Gate
   South of Grand Army Plaza, the new Brooklyn Public Library Building and Mt. Prospect Park

The most direct way to reach any given entrance is indicated on the diagram on page 159, showing the location of the Botanic Garden with reference to streets and transit lines. Consult also the directions for reaching the Garden, as given on the third cover page.

Plantations

The Brooklyn Botanic Garden grounds comprise the following sections or gardens. The numbers in parentheses, following the name of the section or garden, indicate the number of the nearest or most convenient entrance or entrances, as given on page 159.

Gardens within a Garden [1]

1. General Systematic Section (4, 5)
2. Native Wild Flower Garden (Local Flora Section) (1, 6)
   (In this Garden the trees, shrubs, and herbaceous plants are arranged on an *Ecological* basis.)
3. Children's Garden (4, 5)
4. Japanese Garden (2)
5. Rock Garden (5)
6. Water Gardens (2, 3)
7. Conservatory Garden (2–5)
8. Laboratory Plaza (2, 3, 4)
9. Iris Garden (3, 5)
10. Shakespeare Garden (4, 5)
11. Rose Garden (1, 6, 2)
12. Rose Arc (1, 6, 2)
13. Moss and Liverwort Garden (2)
14. Horticultural Section (1, 6)
15. Wall Garden (1, 6)
16. Herb Garden (2)
    a. Culinary Herbs
    b. Medicinal Herbs
    c. Elizabethan Knot Gardens

[1] An Economic Garden to illustrate economic or "useful" plants, and a Morphological Garden to illustrate facts of the external form or *morphology* of plants are a part of the complete plan of the Botanic Garden, and have once been installed but, for certain reasons, have been temporarily discontinued.

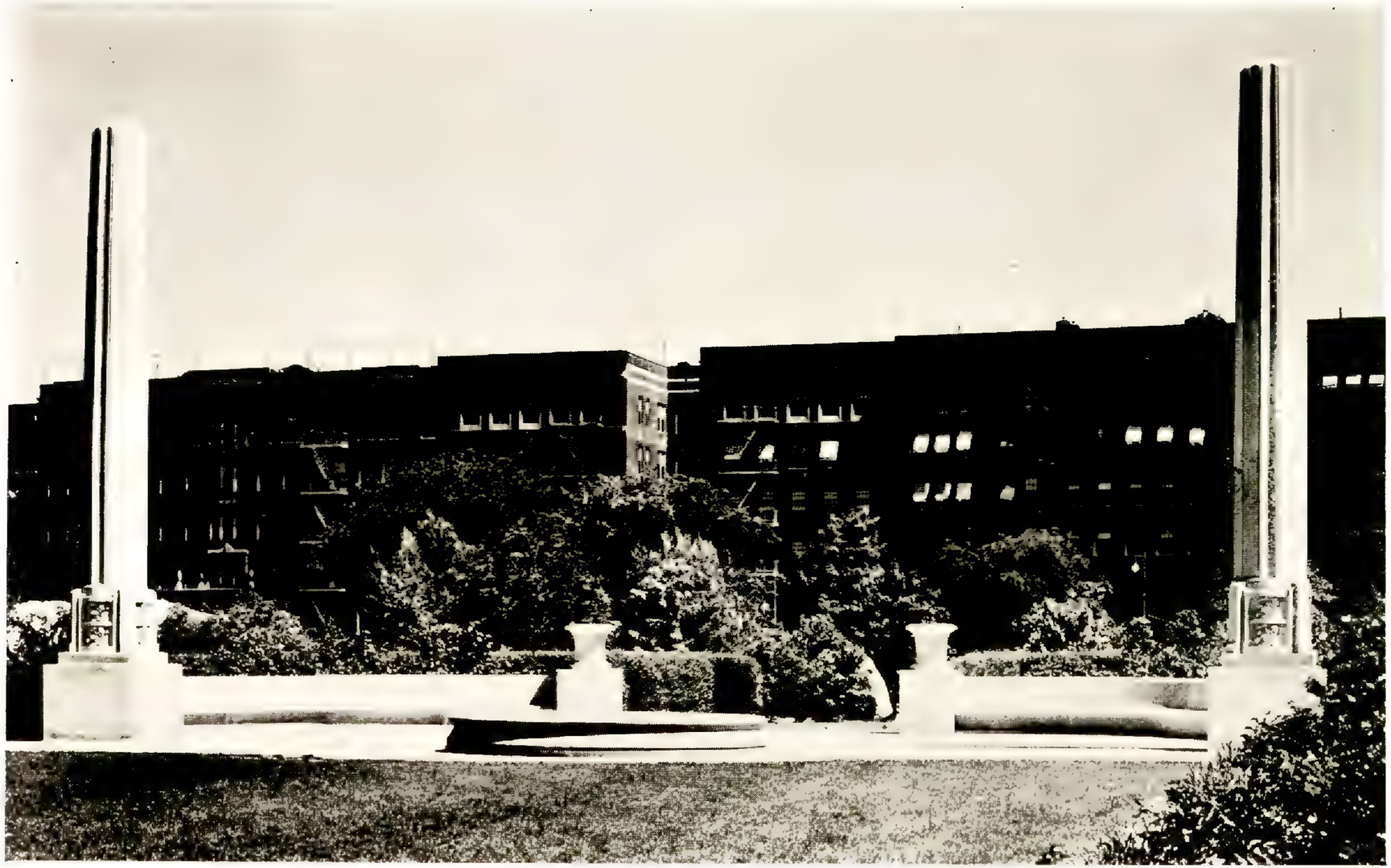


FIG. 3. The Dean Clay Osborne Memorial: Columns, Water Basin, and Seats at the north end of the Long Green, near Eastern Parkway Entrance. (9910)

Horticultural Collections

Listed approximately in their order of flowering.

1. Crocus (4, 5)
2. Daffodils (1, 2, 3)
3. Flowering Cherries, Apples, etc. (1, 2)
4. Poet's Narcissus (2, 3)
5. Tulips (4, 5)
6. Peonies (2)
   a. Herbaceous
   b. Tree
7. Lilacs (1, 2, 6)
8. Azaleas and Rhododendrons (5)
9. Iris, Bearded and Japanese (2, 3, 4, 5)
10. Cannas (3, 5)
11. Hardy Chrysanthemums (4, 5)
12. Asters (Michaelmas Daisies). Varieties of New York and New England Asters (4, 5)

Miscellaneous

1. Decorative and Screen plantings, Hedges, etc. (1–6)
2. Nursery (not open to the public)
3. Experimental Garden (not open to the public)

Horticultural and Landscape Plantings

The Border Mound.—With the exception of the Eastern Parkway frontage and the site of the buildings on Washington Ave., the Botanic Garden property is surrounded by a "Border Mound" of earth, planted with trees and shrubs. This feature was devised by Olmstead and Vaux, the landscape architects of Central Park, New York, and of Prospect Park, Brooklyn, for the purpose of shutting out from the parks the confusion and noise of adjacent streets, thereby giving greater privacy and quiet within the parks. The plan was an inspiration of genius, and is a larger factor than most people realize in giving the Botanic Garden the seclusion and rural character which visitors feel within the grounds.

The Border Mound is planted without reference to the botanical relationships of the plants, but the screen planting, in places, af-

fords a protection which is taken advantage of for certain doubtfully hardy species, which are thus found outside the Garden area where they belong botanically.

Bulbs in the Lawn.—In the fall of 1921, 25,000 bulbs of Crocus were planted naturalistically on the slope of the Border Mound in the southwest portion of the Garden. This was one of the first (if not the first) naturalistic plantings of bulbs in a public park in America. This planting was increased in 1923–25 to about 54,000 bulbs. Other areas have been planted with several varieties of yellow Daffodils (about 27,000), Poet's Narcissus (15,000), Snowdrops (*Galanthus*), Winter-aconite (*Eranthis hyemalis*), Grape-hyacinth (*Muscari botryoides*), Dwarf Blue Hyacinth (*Hyacinthus azureus*, often mistaken for a Grape-hyacinth), and others.

A Walk through the Garden

Point of Beginning

An itinerary through the Botanic Garden plantations may, of course, begin at any one of the six entrances.

Time Required

It is physically possible to walk around the periphery of the Garden, from any given gate and back, in about one half hour, but such a walk would not allow for giving more than passing attention to the plantations.

Not less than one hour should be allowed for a leisurely walk, and for obtaining a conspectus of plants in bloom or other features.

SUGGESTED ITINERARY

Horticultural Section

Entering the Eastern Parkway gate (number 1),[1] the visitor finds himself at once in what has been somewhat arbitrarily called the "Horticultural Section," comprising both natural species and varieties of trees, shrubs, and herbaceous plants derived by plant breeding from wild or natural species. It also contains species

[1] By consulting the folded map, it will be found easy to begin the walk at any entrance and follow the suggested itinerary from that point.

FIG. 4. Portion of Wall Garden, June 16. The entire length is about 385 feet. Initial planting in 1935 with some 2000 plants in about 30 species and varieties. (9422)

plants, whether trees, shrubs, or herbs, that are of value in decorative planting.

This Section occupies what was, at first, known to the Garden authorities as the "North Addition," since it was not in the original tract assigned by the City for botanic garden purposes. The original surface, from the street line to the south border of

FIG. 5. Giant Waterlily, *Victoria cruziana*. Conservatory Pool. October 30. (3769)

Mt. Prospect Park, and from the Park east to the Museum property, was 23 feet above the sidewalk. During 1914 the grade was brought down to the level of the sidewalk, the excavated material being deposited in Prospect Park along Flatbush Avenue.

The present plan of the Section was designed by Mr. Harold A. Caparn, consulting landscape architect of the Botanic Garden. The final grading, topsoiling, and construction work was begun on February 5, 1934, under supervision of the office of the Borough

engineer, Mr. Frank J. Lynch. It was completed during 1935 by laborers under the Civil Works Administration (CWA), succeeded by Works Progress Administration (WPA). The foundational planting was done during the spring of 1935 by our own men under Mr. Caparn's supervision. The central feature of the Horticultural Section is the *Long Green,* 60 feet wide and more than 400 feet long from north to south. At each end of the Long Green are structures which constitute

The Dean Clay Osborne Memorial

This Memorial was made possible by a gift of $30,000 from Mrs. Sade Elizabeth Osborne to provide a memorial to her late husband, Dean Clay Osborne. The gift, reported to the Trustees at their meeting on October 13, 1938, was subsequently increased to $32,208.44. The memorial, designed by Mr. Caparn (John Theodore Haneman, architect, associate), was formally presented on the afternoon of April 19, 1939, the wedding anniversary date of Mr. and Mrs. Osborne. It consists of two sets of features, as follows:

Those at the south end include a semicircular plaza paved with bluestone flagging. At the south periphery of this plaza are two curved seats, with "coupled" columns at their inner or adjacent ends. These columns, 14 feet high, are similar to those in the Boboli Gardens, Florence. Near the north edge of the plaza is a water basin 17 feet 6 inches in diameter, containing a fountain with pedestal and bowl. The contractor is authority for the statement that the stone (measuring 11 feet 3 inches by 8 feet 10 inches) from which the fountain bowl was carved was the widest piece of Indiana limestone ever brought to New York City.

The features at the north end also comprise a plaza, similar to that at the south end, with curved seats at the north edge. The monolithic dies at the inner ends of the seats carry beautifully carved urns. At the outer end of each seat is a fluted column 35 feet high. At the base of the fluted shafts are panels with carved leaves of the Ginkgo or "Maidenhair" tree, designed by Mr. Caparn. So far as we can ascertain, this is the first time the Ginkgo has been employed as a *motif* in this position, so commonly

occupied in Roman architecture by the *fasces* or bundles of rods enclosing an axe—symbols of imperial authority. It was thought that for a botanic garden a design more symbolic of peace and the beauty of the plant world would be more suitable. Near the south edge of the plaza is a water basin 16 feet in diameter, but containing no fountain. The designs, after acceptance by the donor and by our Governing Committee, were approved by The Art Commission of the City.

As stated above, the plants in the Horticultural Section are horticultural varieties and species that have horticultural value.

What are Horticultural Varieties?

It may be noted here that the *particular kinds* of wild plants are called *species*. Under cultivation new forms often arise not found growing wild; they may arise from wild species or from other cultivated forms. These are called "garden forms" or "horticultural varieties," and may arise in at least three ways: 1. Seed variation; 2. Bud variation; 3. Crossing or hybridizing.

1. *Seed variation:* One of the best known horticultural varieties resulting from seed variation is the famous original Concord Grape, which was produced by a seed of the wild grape (*Vitis Labrusca*) planted at Concord, Mass., in the fall of 1843 by Ephraim W. Bull. This plant fruited for the first time in 1849, and all other Concord Grape vines in the world have been derived, either directly or indirectly, from this one by propagation from cuttings. The famous "Golden Glow" was derived by seed variation, as was also the Burbank potato.

2. *Bud variation:* Occasionally one or more of the buds on a plant will produce branches differing characteristically from the typical branches. This is called *bud sporting*. It is believed to have been the origin of the Washington or California *Navel Orange*. Among the most famous bud sports of flowering plants are the *Moss Roses*, of which there are many varieties. Some horticultural varieties of potato arose by bud sporting, the process being called by farmers, "mixing in the hill." Among houseplants the Boston Fern (and other varieties of *Nephrolepis exaltata*) arose by bud sporting.

3. *Crossing or hybridizing:* Plants are crossed by transferring pollen from the flowers of one to the stigmas of the flowers of another. In this manner have arisen numerous varieties of apples, pears, and other fruits, and innumerable varieties of such plants as Iris, Orchid, Peony, Tulip, many Roses (*e.g.*, Hybrid Teas, Hybrid Perpetuals), the Lilac, and others.

FIG. 6. *Crocus vernus*, "naturalized" in the lawn. March 28. (6781)

Bordering the west walk of the Horticultural Section is

The Wall Garden

The Wall Garden was completed, ready for planting, during 1934 by the CWA (Civil Works Administration), one of the numerous predecessors of the present WPA (Works Progress Administration). Back of the surface wall is a reinforced concrete wall that serves to hold the embankment. Between the two walls is a layer of topsoil, and the stones of the surface wall are laid with topsoil between, as in all wall gardens. A concealed irrigation pipe runs along the top of the wall. Small glacial boulders were used (with other stones) because they happened to be uncovered in plentiful quantity during grading operations. The total length of the Wall Garden is about 380 feet. Planting was begun in 1934. So far as we can ascertain, this was the first example of a wall garden in a public park or garden in the United States. It was designed by our landscape architect, Mr. Harold A. Caparn, and constructed under his general supervision. It was planted by our own men under the supervision of our horticulturist, Mr. Montague Free.

Southwest of the Horticultural Section is the

Native Wild Flower Garden (Local Flora Section)

The entrance to the Native Wild Flower Garden or Local Flora Section is west of Lilac Triangle. When this area was first being cultivated for planting (in 1911), the plow ran into an old curbstone; this, and other evidences, revealed that a street had previously crossed at this point in a general east-west direction.

This section occupies about two acres on the slopes of the terminal moraine which runs the length of Long Island. It is devoted to plants growing wild within a hundred miles of New York, the "Local Flora Range" of the Torrey Botanical Club. On a small scale various environments are represented illustrating soil differentiation and geographic restriction of species in the area, *i.e.* the plants are arranged on an ecological basis. Perhaps of most interest in the bog,—with cranberries, pitcher-plants, sundews, bog orchids, and a border of white cedar (*Chamaecyparis*), larch, and spruce. It is a large, irregular, concrete basin filled with peat,

which keeps constant the necessary acid conditions required for bog plants. Such bogs are abundant in the New Jersey pine barrens and are occasional in the mountainous wooded country to the northward. Our restricted space has made it necessary to combine plants of both regions. On the cool banks adjoining the bog are plants of northern mountain slopes (such as the Catskills) : bunchberry (*Cornus canadensis*), twin-flower (*Linnaea*), creeping snowberry (*Chiogenes*), hobblebush (*Viburnum alnifolium*). On the opposite side of the broad grass pathway a sand-rimmed pond, similar to those found in the glacial moraine of Long Island, is edged with thickets of bayberry (*Myrica carolinensis*), chinquapin oak (*Quercus prinoides*), and beach plum (*Prunus maritima*). In the water itself the golden club (*Orontium*), pickerel-weed (*Pontederia*), dwarf pond-lily (*Nymphaea odorata* var. *minor*), arrowhead (*Sagittaria*), and other species characteristic of the coastal plain are found. North of the pond is a replica of the New Jersey or Long Island pine barrens, a sandy area covered with pitch pine and clumps of *Hudsonia, Arenaria squarrosa,* and *Corema.* Opposite the sand barren the brook flows into a wet meadow which is filled with marsh marigold (*Caltha palustris*) and globeflower (*Trollius laxus*), followed in the fall by native asters and goldenrods. The brook, following the inside margin of the west border mound, is lined by ferns, skunk cabbage, and *Mertensia.* It has its source in a *Rhododendron* thicket in the wooded northwestern part of the area.

This woodland, occupying approximately an acre, is carpeted in spring with familiar plants—bloodroot (*Sanguinaria*), dog's-tooth violet (*Erythronium*), Canada mayflower (*Maianthemum*), trilliums, May apple (*Podophyllum*), and various species of violets. It may be stated that, with the exception of some native orchids, woodland species of *Lycopodium,* some species of *Polygala,* and a few others, a large majority of the interesting native plants of the environs of New York City are being successfully grown here.

East of the Local Flora section is the

Lilac Collection

This collection was at first confined to the " Lilac Triangle," but has since been extended northward and to the west. The collec-

FIG. 7. Daffodils (*Narcissus Pseudo-Narcissus*) variety "Emperor," naturalized in the lawn. April 29. (3929)

tion comprises both species and varieties. Lilac species (the genus *Syringa*) may also be found with their botanical relatives in the Olive Family, in the southwest part of the General Systematic Section.

As the number of varieties of lilac is so great, an attempt has been made to place together those that resemble each other. In the south part, toward the point of the lilac triangle, are about twenty lilac species. These are followed by varieties and hybrids of species other than *Syringa vulgaris*. Along the Rose Garden fence are a number of the tall early lilacs called the "Giraldii hybrids," including Lamartine and Mirabeau.

The main part of the collection consists of the horticultural varieties of *Syringa vulgaris*. As outstanding varieties may be mentioned:

Single White: Vestale, Mont Blanc
Single Pink: Macrostachya, Lucie Baltet, Mme. F. Morel
Single Reddish: Reamur, Rochambeau, l'Oncle Tom, J. de Messemaker
Single Bluish: Boule Azurée, Saturnale (light bluish), Cavour (dark violet)
Double White: Edith Cavell, Mme. K. Bruchet
Double Pink: Mme. Antoine Büchner (cluster open), Duc de Massa and William Robinson (flowers globular), Hippolyte Maringer (cluster extra large), Waldeck-Rousseau (cluster open), Charles Sargent (cluster dense)
Double Reddish: Paul Thirion
Double Bluish: Emile Gentile

There are altogether about 20 species and 180 varieties in the collection, making it one of the most comprehensive Lilac collections in America.

West of the Lilacs, and within a separate enclosure, is

The Rose Garden

The Rose Garden was made possible through the generosity of Mr. and Mrs. Walter V. Cranford, former residents of Brooklyn. The design was prepared by Mr. Caparn. Construction work started in June, 1927, and by the spring of 1928 nearly three thou-

FIG. 8. "Exhibit of the Week" label at the Smoke Tree (*Cotinus coggygria*). June 16. (9436)

sand bushes in about six hundred species and varieties were growing. The Rose Arc, a nearby extension of the Rose Garden, was constructed in the fall of 1935—a gift from Mrs. Cranford as a memorial to her late husband. With the plants in the Rose Arc the collection includes more than four thousand roses in over seven hundred species and varieties.

Examples of almost every type of rose capable of surviving in our climate are represented in the garden. Some of the varieties are rather rare in general cultivation, as, for example, the climbing roses Félicité et Perpétue, a derivative of *Rosa sempervirens;* Ruga, one of the Ayrshire roses; and Mermaid, derived from *Rosa bracteata,* an evergreen species native to China and naturalized in our southern states. Other interesting varieties include: the first of the Pernetiana roses, Soleil d'Or, which was the result of a cross by M. Pernet-Ducher between a variety of *Rosa foetida* and a Hybrid Perpetual; the parti-colored Fair Rosamond's Rose (*Rosa damascena* var. *versicolor*); and the Green Rose, *Rosa chinensis* var. *viridiflora,* which is unattractive but intriguing. The bulk of the plantings is made up of the popular Hybrid Teas, with adequate representation of the Hybrid Perpetual, Tea, Polyantha, Climber, Rambler, Moss, Pemberton, China, and minor groups.

Originally the varieties in the Tea, Hybrid Tea, Hybrid Perpetual, and Polyantha groups were planted in chronological sequence of their order of introduction with a view to giving a picture of rose progress. Practical considerations necessitated the partial abandonment of this scheme. Some of the older varieties are no longer propagated by the growers. It is, therefore, difficult and ofttimes impossible to replace ailing plants of those varieties. Now, if a variety has to be discarded because of ill-health or lack of beauty, we usually substitute one of the newer introductions. This helps to keep the garden up-to-date in the matter of varieties.

Rose Arc

Leaving the Rose Garden at the south gate, one comes to the Rose Arc. As its name implies, the area is roughly semi-circular in form, bounded on the curved side by a series of 27 arches furnished with rambler roses. The curved embankment back of the arches is covered with the Memorial Rose (*Rosa Wichuraiana*).

In front of the arches are three beds containing more than 600 Hybrid Tea Roses. Surrounding the pool, which is the central feature, is a wide planting of the rose Clytemnestra. The two level plateaus, one at each end of the arc, are for Standard Roses, not yet (1940) planted.

The bronze statuette in the pool, "The Call of the Sea," is by Harriet Frishmuth; this, and the two Stone Urns, designed by Mr. Caparn, were also given by Mrs. Cranford.

The illustrated guide to the Rose Garden (*Guide No. 9*), by Montague Free, is a treatise on rose species and varieties, with seventeen pages devoted to the cultivation and care of roses. This is on sale at the Information Booth in the Laboratory Building at 50 cents a copy.

The Esplanade

North of the Rose Arc the *Esplanade* extends to the Museum embankment, at the top of which, toward the west, is located the *Overlook* from which may be obtained an excellent view of the Rose Garden and the Lilac Triangle. The Esplanade is intended to serve as an approach to the Brooklyn Museum when that building is completed. The double rows of trees on each side are Schwedler's variety of the Norway maple (*Acer platanoides Schwedleri*).

Plans have been made for a row of flowering cherries extending up each side of the Esplanade, with a path between the cherry rows and the maples.

A Choice of Routes

a. To White Oak Circle

From the Rose Arc one may continue south (see map of grounds) to the *White Oak Circle,* containing a White Oak (*Quercus alba*) planted in 1916 by the late Mr. Alfred T. White, a Benefactor and Patron, and "father" of the Brooklyn Botanic Garden. The bronze tablet marking this oak reads as follows:

"A fresh memorial as, each year,
New life and buds and leaves appear;
A living, monumental tree,
True type of immortality."

FIG. 9. Local Flora Section, View facing northwest, showing pool and sand area. *Heliopsis helianthoides* at the right. September 28. (8508)

About 200 feet south of White Oak Circle one comes to the *Rock Garden* on the right (west) side of the walk.

b. To Ginkgo Triangle

Or, from the Rose Arc, one may turn abruptly to the left (east) and walk along the southern end of the *Esplanade* to the *Ginkgo Triangle,* named from the specimen of the Maidenhair-Tree (*Ginkgo biloba*) in the center of the triangle. Other Ginkgos are near by.

Cherry Walk

From the Ginkgo Triangle, one may pass to the left (north) along the Brook to the point where it flows out of the Lake. From here, *Cherry Walk* leads off to the left, with the plateau of flowering cherries, crabapples, etc., also on the left. The trees along each side of Cherry Walk are of the double-flowered pink variety known as "Kwanzan" (the name of a mountain in Japan). They are usually in bloom during the first week in May. The collection includes about 15 varieties of cherries and 5 varieties of crabs.

Flowering Crab-apples

On the embankment at and near the north end of Cherry Walk are several kinds of Flowering Crab-apples (*e.g., Malus atrosanguinea, M. floribunda, M. micromalus,* and *M. Sargentii*). Toward the east these trees are arranged so as to provide two bays occupied by a collection of Herbaceous Peonies. Other flowering apples will readily be located in other parts of the Botanic Garden during their period of bloom (the fore part of May).

Herb Garden

Further east, in the extreme northeast corner of the Botanic Garden, is the *Garden of Medicinal and Culinary Herbs.* A flight of steps leads down into this garden from the top of the Museum embankment at its east end. In the center of the garden are two *Elizabethan Knot Gardens,* the "thrids" being formed of culinary and strewing herbs. The west and south beds contain the main planting of herbs used in the kitchen and for perfumery.

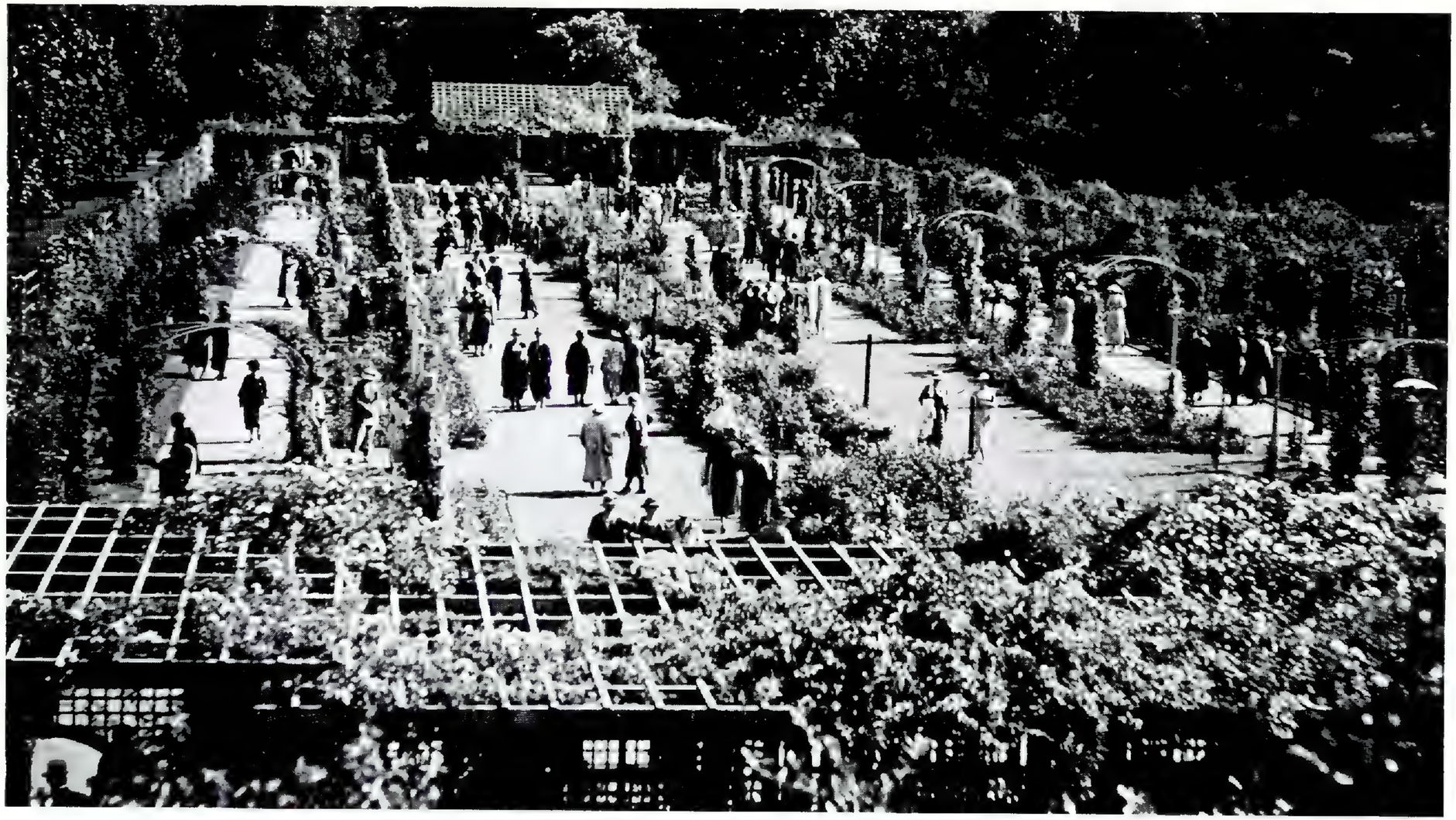


FIG. 10. The Rose Garden on Rose Garden Day. June 9. (9322)

The Medicinal Plants and the Poisonous Plants occupy the remainder of the garden. There are approximately 56 culinary plants in the garden, 87 medicinal herbs, 15 medicinal trees and shrubs, and 10 poisonous plants, in addition to some of the medicinal plants which are also poisonous.

The Medicinal Plants were chosen by a national committee of physicians and pharmacists, and the culinary plants by a national committee representing the Horticultural Society of New York, The Garden Club of America, the Herb Society of America, the Woman's National Farm and Garden Association, and the Federated Garden Clubs of New York State.

The *Italian Wellhead*, at the east end of the Garden, was previously on the private place of Mr. A. Augustus Healy, former president of the Board of Trustees. It has been placed in the Botanic Garden on indefinite loan from the Brooklyn Museum.

A full account of this Herb Garden may be found in Brooklyn Botanic Garden *Leaflets*, Series XXV, No. 2–4. This *Leaflet* is on sale at the Laboratory Building for five cents a copy.

Japanese Garden

This garden is a Niwa or landscape garden, and was made possible in 1914 by a generous gift from Mr. Alfred T. White. It was designed by Mr. T. Shiota, a Japanese landscape architect, and constructed largely by Japanese workmen, under his supervision. It has since been maintained, in part, by Japanese gardeners and at private expense, under the general supervision of Miss Mary Averill, honorary curator of Japanese gardening and floral art. Constructed in 1915, this was, so far as can be ascertained, the first Japanese garden in a public park east of San Francisco, where there is a Japanese Garden, in Golden Gate Park, that antedates the one in Brooklyn.

There is not space here to explain the Garden, except to emphasize the fact that a Japanese Niwa Garden is not a flower garden, but an attempt to represent, on a small scale, a landscape. The plants are not confined to Japanese species, but the Japanese gardener uses any material that will insure the best results in the given locality. The structure standing in the water is a *Torii* (pronounced toreé), serving as a gateway to the *Inari Shrine*, which

stood on the hill beyond.[1] Inari, the cult of the fox, is a very primitive Shinto sect. The shrine was of coast redwood (*Sequoia sempervirens*). Across the lake is a *Tea House,* and the structure facing the island is the *Waiting Pavilion.* About the only flowers allowable in a Japanese landscape garden are the Azalea, Flowering Cherry (or other flowering tree), Iris, Wisteria, and Lotus.

The best view of the Japanese Garden is obtained from the Tea House, nearly opposite which is *Exit No. 2* (Washington Ave., North Gate).[2]

On the east side of the Botanic Garden, north of the Laboratory Building, is the *Nursery,* surrounded by a mixed hedge. In the protection of the Nursery several plants, doubtfully hardy in this climate, have remained alive for several years.

From the Tea House, turning right (south), and taking the next right turn at the Austrian Pines, one finds himself on the flagstone path leading over Boulder Hill and past the

Alfred T. White Memorial

The bronze tablet was designed by Daniel Chester French, among whose numerous works is the statue in the Lincoln Memorial, at Washington, D. C. The mounting of the tablet and the seat were designed by Henry Bacon, who was the architect of the Lincoln Memorial.

The tablet was presented in 1923 by a committee of citizens, with Mr. Frederick B. Pratt, as Chairman, in recognition of Mr. White's outstanding public services and benefactions in Brooklyn, of which his initiation of the Brooklyn Botanic Garden, and his generous gifts thereto were by no means least.

Boulder Hill is so named from the large glacial boulder on its summit. (See Brooklyn Botanic Garden Guide No. 7, *The Story of Our Boulders.*)

[1] This shine was burned to the ground on January 25, 1938, by vandals, probably as an anti-Japanese demonstration in connection with the Japanese war on China. It will not be rebuilt for the present.

[2] An illustrated guide book (Guide No. 4), *The Japanese Garden of the Brooklyn Botanic Garden,* by Bunkio Matsuki, is now out of print. Guide No. 6, *Japanese Potted Trees* (*Hachinoki*), also by Bunkio Matsuki, 11 pages, 11 illustrations, is on sale at the Laboratory Building. Price 40 cents.

FIG. 11. Cherry Walk, May 9. Facing north. The registered attendance at the Botanic Garden on "Cherry Blossom Sunday" has exceeded 50,000. (9827)

The Lake Walk

The path along the south shore of the Lake is called the *Lake Walk*. Near the east end of this walk is a Japanese Lantern on a small island in the Lake.

Near the west end of the walk, on an island at the outlet of the lake, is a bronze statue, "*Indian Maid and Fawn*," by Phimister Proctor, presented to the Garden on May 8, 1928, by the late Mr. George D. Pratt, of Brooklyn, formerly a member of the Botanic Garden Governing Committee.

The aquatic plant in the Lake, with some of the leaves floating and other leaves, together with the waterlily-like flowers, raised well above the surface of the water, is the East Indian Lotus (*Nelumbo nucifera*).

Moss Ravine

Few botanic gardens have included the mosses, and plants below the mosses, in their plantations; and yet these plants are of popular interest, and the maintenance of such a collection of living plants is an advantage for school and college classes and others specially interested in those groups. With this thought in mind a reëntrant was excavated in the north facing slope of Boulder Hill during the winter of 1936–37. This excavation was lined with glacial boulders (the only "native" rock on Long Island), and furnished with a "weeping" pipe for irrigation to keep moist the surfaces of the rocks and the soil between the rocks. In the spring of 1937 about 25 species of mosses, liverworts, and lichens were gradually "planted" and labeled. Some of these succeed much better than others in the dust-, soot-, and gas-laden air of the city.

Some of the Green Algae have also become established on the surface of the soil and rocks.

Laboratory Plaza

Passing around Boulder Hill to the left, on the asphalt walk and over the boulder bridge, one comes to the *Magnolia Triangle* and then to the *Laboratory Plaza*. The collection of Magnolias is largely within this Plaza. The central motif of the Plaza is *The*

FIG. 12. Garden of Medicinal and Culinary Herbs. Facing east. (9893)

Compass, a circle 18 feet in diameter. The rays of the compass are paved with yellow, red, and black marble terrazzo. At the center of the compass is a bronze Armillary Sphere, serving as a sundial, and designed by Mr. Caparn. It bears the old classical sundial motto:

Serene I stand amyddst ye flowres
To tell ye passing of ye howres.

East of the compass, in front of the main entrance to the Laboratory Building, is a *Meridian Panel,* or panel of terrestrial position. This was laid out with the cooperation of Mr. Weld Arnold, then of the School of Surveying, American Geographical Society, but now of Harvard University. The panel itself, of black Belgian marble terrazzo, has imbedded in it the geographical and magnetic meridians, and the following data:

At the North End:
Magnetic north Variation, 11° 11′ west (in 1931)
Annual increase, 4′
At the South End:
Altitude above mean sea level, 115 feet
North latitude, 40° 40′ 06″
Longitude west of Greenwich, 73° 57′ 48″
To the North Pole, 3416.7 statute miles
To the Equator, 2798.2 statute miles

Conservatory Garden

A short side trip to the south, past the Laboratory Building, will take one down the steps to the *Conservatory Garden,* containing two Waterlily Pools. The northern one is piped for heating water when necessary, and contains only tropical forms, including the Giant Waterlily (*Victoria*). The southern pool contains the hardy sorts that do not require heated water. These two pools were the gift of Mr. Alfred T. White.

The flower borders, approximately 100′ × 30′ on the east side and 100′ × 10′ on the west, are gay from June till frost with flowering annuals and bedding plants.

The water basin and fountain, designed by Mr. Caparn, are due to a bequest of Alfred W. Jenkins, 1930. The four bronze heads

at the outlets of the bowl were designed by Isabel M. Kimball, of Brooklyn, the design being based on the head of a Catfish or Bullhead, whose body is imagined to extend back into the water in the bowl.

From the Conservatory Garden one may retrace his steps to the main entrance of the Laboratory Building and proceed westward through the magnolias to the

SYSTEMATIC SECTION

What the Systematic Section Aims to Show

1. Different kinds of seed bearing plants.
2. The relationship of plants.
3. How the plants of a given group may be used in decorative planting (*e.g.*, for hedges, massing, herbaceous borders, ground cover, etc.).
4. Horticultural varieties derived from wild species by plant breeding.

Most of the plants in the Systematic Section are not included in the Local Flora area, as defined on page 170, but a few Local Flora plants are included in groups not otherwise represented.

Planting Plan

In the Systematic Section plants are grouped according to families. For example, the various plants of the buttercup family are in one place. The plan is approximately that of the Engler system. It is believed that plant groups are related to each other like the branches of a tree, but the exact relation of families and orders is often debatable. A botanic garden, once planted, cannot easily be changed; trees and shrubs, in particular, cannot be moved with constantly changing ideas as to classification. The planting of the Systematic Section of the Brooklyn Botanic Garden was begun in 1914.

The seed-bearing plants that have no "flowers" (Gymnosperms) are found north of the walk which leads from Magnolia Triangle to the Ginkgo Triangle, and are chiefly east of the Brook in the area which includes Boulder Hill, and beyond.

FIG. 13. Japanese Garden. The Island (*Yami-Jima*), showing Drum Bridge, Stepping Stones, Storks, Cave, Stone Lantern (*Yukimi*), Pebble Beach, and, beyond the Drum Bridge, the Waiting Pavilion (or Moon View House). In the lower left-hand corner are the Idling Stones (*Tobi-ishi*). (2446)

The plants that bear flowers (Angiosperms), in the Systematic Section, are arranged with a wide grass aisle (approximately 30 feet) between the Plant Orders, and a narrow aisle (about 10 feet wide) between the Plant Families. As one looks over this Section from any elevated point the planting plan stands out very distinctly.

The arrangement of the Systematic Section is indicated on the folded map at the end of this Guide.

Boundaries of Orders and Families

The boundaries of the various Orders and Families that contain shrubs are, in many cases, planted with hedges formed of plants that belong to the given Order or Family, or with plants of the given group that have special ornamental value.

Herbaceous and Woody Plants Together

Many botanic gardens comprise at least three sections, as follows:

1. Arboretum (Latin, *arbor,* a tree) comprising only trees.
2. Fruticetum (Latin, *frutex,* a shrub) comprising only shrubs and vines. Vines are not recognized separately from shrubs in the manuals of botany, a vine being technically considered as a climbing or trailing shrub.
3. Herbaceous Garden, comprising only herbaceous (*i.e.,* non-woody) plants.

These three divisions classify plants according to their form and habit of growth, and the possession of woody *versus* herbaceous stems, not according to their botanical relationship.

In the Brooklyn Botanic Garden, educational (and, to a subordinate degree, landscape and spatial) considerations led to grouping the woody and herbaceous plants together in the Systematic and the Local Flora Sections. This plan was suggested by Mr. Caparn, and is worthy of special note because it not only provides areas of lawn and secures pleasing landscape effects not otherwise possible in the limited space at our disposal, but also because it gives added educational features by showing the botanical affinities of trees and shrubs with herbaceous plants, and the rela-

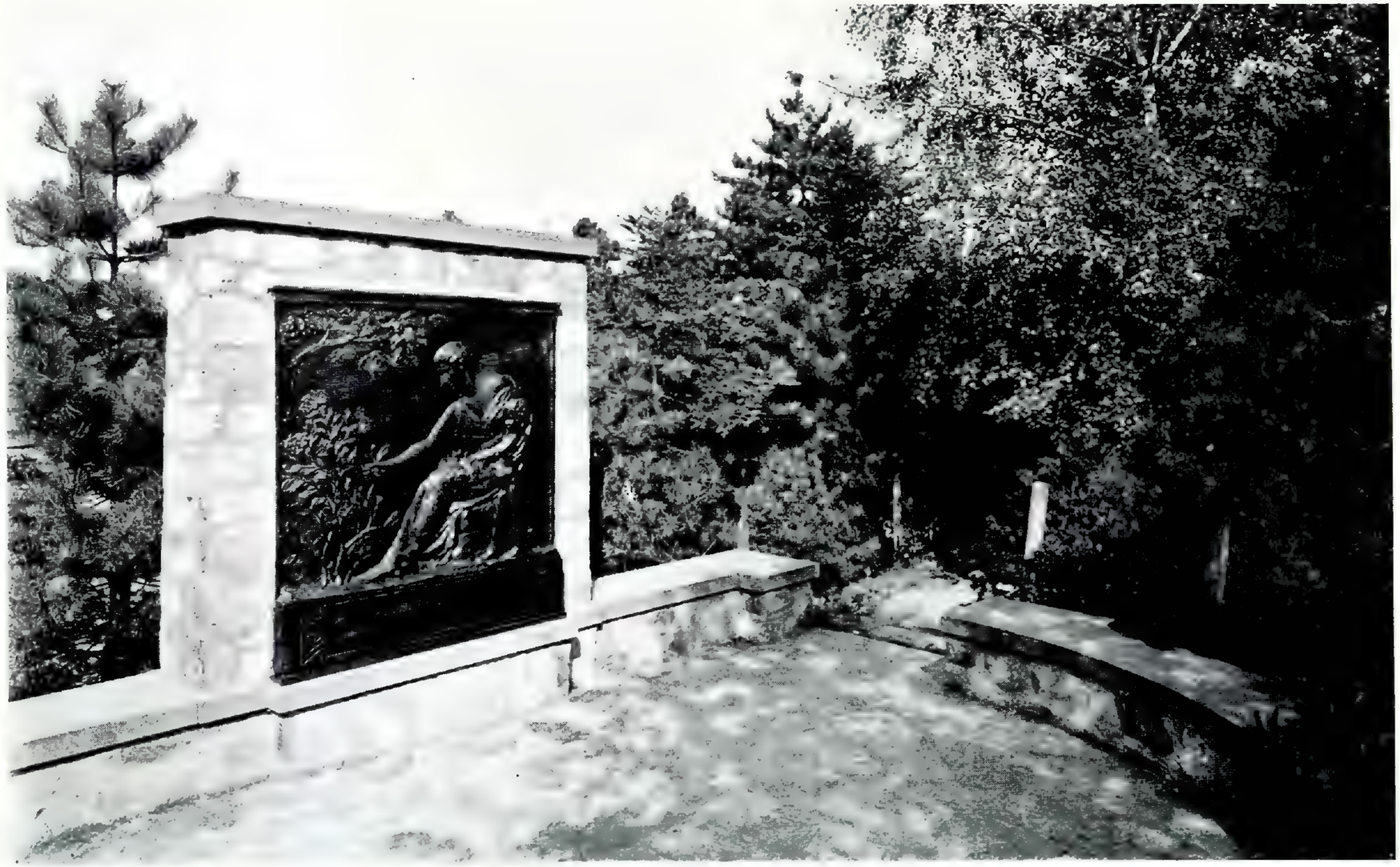


FIG. 14. Alfred T. White Memorial, Unveiled June 7, 1923. (5633)

tive percentages of woody and herbaceous plants (within the limits of hardiness at Brooklyn) in the various families, orders, and larger subdivisions of the Plant Kingdom. Thus, for example, it will be seen that in the group of the Poppies and their relatives (*Papaverales*) there are no trees or shrubs hardy in Brooklyn; in the group of the Roses and their relatives (*Rosales*) there is a generous proportion of both woody and herbaceous plants; while in the Horsechestnut and Willow groups (*Sapindales* and *Salicales*) there are few if any herbaceous plants hardy here. Among the Gymnosperms there are no herbaceous plants.

The following great groups of plants are represented in the Systematic Section.

Thallophytes

Algae. About fifty genera of Algae are found in the Botanic Garden, mostly in the Lake and Brook. These include Blue Green Algae, such as *Glococapsa, Nostoc*, and *Oscillatoria;* and Green Algae, such as *Pleurococcus* (on surface of rocks, tree trunks, etc.), *Ulothrix, Oedogonium, Vaucheria, Spirogyra* (Pond scum), and *Hydrodictyon* (Water Net), common in our Brook.

Lichens and Fungi. From time to time Lichens and Fungi are on exhibit in the Moss Ravine.

Bryophytes

Liverworts and Mosses are grown in the Moss Ravine.

Fern Allies

In the Moss Ravine are also a few species of Clubmosses and Horsetails.

Ferns

West of the Moss Ravine are Ferns, representing a middle stage of plant evolution. Fern fronds are flattened and fused branch systems, the primitive form of leaves.

Seed-bearing fossil plants related to the Ferns are known. They were at first called Pteridosperms (ferns that bear seeds). From the fact that they are related to both the cycads and the ferns they have been called *Cycadofilicales.*

Gymnosperms

The essential part of a seed is the *embryo*, or very young plant, which consists of a young stem (*caulicle*), one or more seed-leaves (*cotyledons*), and a terminal bud (*plumule*). When the seed becomes ripe the embryo usually ceases to grow. When the seed is planted the embryo resumes its growth and becomes established in the soil as a new plant. Gymnosperms are so called because their seeds are "naked," i.e., not enclosed in an ovary.

Cycads (*Cycadales*) are represented in our collection by all nine living genera. Because they are not hardy in the New York region they are housed in the Conservatories, in House No. 11. The Old World Cycads are *Cycas, Bowenia, Macrozamia, Encephalartos,* and *Stangeria.* The American Cycads are *Microcycas, Zamia, Ceratozamia,* and *Dioon.*

Ginkgo, or Maidenhair-Tree (*Ginkgo biloba*), forms a link between Cycads and Conifers, the Cycads and Ginkgo being the only seed-bearing plants with motile sperms. Ginkgo has never, with certainty, been found growing wild; so far as definite evidence goes, it is a cultivated plant, and has been preserved by being grown in temple gardens of China and Japan. It is the only living species of the order, *Ginkgoales.*

Conifers (*Coniferae*) are planted south and east of the Lake. They include five families, as follows:

1. In the *Yew Family* (*Taxaceae*) we have four species and about 23 varieties of Yews; also the Japanese *Torreya* (*Torreya nucifera*), the "Plum-Yew" (*Cephalotaxus drupacea*), and its variety, *C. drupacea* var. *sinensis.*

2. The *Araucaria Family* (*Araucariaceae*) is represented by the Norfolk Island Pine (*Araucaria excelsa*) in the Conservatories, and by the Monkey Puzzle Tree, *A. auraucana* (*A. imbricata*), a small specimen of which has survived outdoors (in the sheltered nursery) for sixteen years.

3. In the *Pine Family* (*Pinaceae*) we have about twenty species of Pine; Cedars, such as Cedar of Lebanon (*Cedrus Libani*), the Atlas Cedar (*C. atlantica*), and the Deodar Cedar (*C. deodara*); also larches, hemlocks, spruces, and firs.

4. In the *Bald Cypress Family* (*Taxodiaceae*) we have Bald

FIG. 15. Laboratory Plaza. Inner hedges of *Euonymus alata* var. *compacta;* outer hedge, California Privet. View from the roof of the Laboraory Building, November 4. (9264)

Cypress (*Taxodium distichum*), *Sequoia, Cryptomeria,* and the Umbrella Pine (*Sciadopitys verticillata*).

5. The *Cypress Family* (*Cupressaceae*) includes Arborvitae (*Thuja*), Japanese Cypress (*Chamaecyparis*), and Juniper. Juniper (*Juniperus*) has fleshy cone-scales, fused to appear like a berry.

The *Gnetales* have rudimentary floral envelopes, and the group is somewhat intermediate between Gymnosperms and Angiosperms. Two of the three genera are in the Botanic Garden: The tropical *Gnetum gnemon* in the Conservatories; and the Asiatic *Ephedra distachya* in the Japanese Garden. In all the Gnetales the embryo has two cotyledons.

Angiosperms (Plants with Flowers)

Flowering plants are called "Angiosperms" from the fact that their *seeds are enclosed* (in an ovary). There are two great groups of Flowering Plants, namely, those, like the bean, whose embryo has two seed-leaves or cotyledons (*Dicotyledons*); and those, like the corn, whose embryo has only one seed-leaf (*Monocotyledons*). By far the larger part of the Systematic Section is occupied by the Angiosperms.

Dicotyledons without Petals (Apetalous)

Southwestward from the Gymnosperms, on the west side of the Brook, are Angiospermous trees having flowers without floral envelopes (calyx and corolla), and usually borne in cone-like *catkins* or *aments* (the so-called ament-bearers or *Amentiferae*). In the Hickory, Oak, Chestnut, and others only the staminate flowers are in catkins. Most of these forms are wind-pollinated, including the Birches, Alders, and others, of the Birch Family (*Betulaceae*). Here, also, are the Beeches, Oaks, and Chestnuts, of the Beech Family (*Fagaceae*); the Walnuts and Hickories, of the Walnut Family (*Juglandaceae*); and the Elms (Elm Family, *Ulmaceae*).

South of the east-west walk, leading to the White Oak Circle, are the Mulberries and Paper-Mulberry, wind-pollinated trees of the Mulberry Family (*Moraceae*), and the insect-pollinated Fig of the same Family.

The Willows and Poplars (Willow Family, *Salicaceae*) are

FIG. 16. Laboratory Building and north Waterlily Pool of the Conservatory Plaza, facing north. September 14. (8392)

planted along the Brook (toward the south) in order to secure the streamside conditions of a natural habitat.

Dicotyledons with Separate Petals (Polypetalous)

The plants in all the Orders on the east side of the Brook, beginning with the Magnolias (*Magnoliaceae*) and proceeding down through the Garden to the Dogwoods (*Cornaceae*), have flowers with separate petals, usually in 5's, less commonly in 4's.

From north to south one passes, in succession, important groups such as the Buttercups and their relatives, Poppy, Mustard, Hydrangea, Rose, Pea, Maple, Linden, Aralia, Dogwood, and others.

Dicotyledons with Petals More or Less United (Sympetalous)

After the Dogwoods (noted above), the plants of the remaining Orders of Dicotyledons—Heath Order (*Ericales*) to Bellflower Order (*Campanulales*)—have flowers whose petals are more or less united.

The Heath Order, including Azaleas, Rhododendrons, Mountain Laurel, Heather (*Calluna*), Heath (*Erica*), and others, is on *Azalea Knoll* and *Azalea Bank,* at the extreme south end of the Systematic Section.

After the Heaths, the Orders of the Dicotyledons follow up the west side of the Brook, terminating with the plants whose flowers have petals united to form a bell-shaped floral envelope—the *Campanulales,* named from the Bellflower (*Campanula*). The chief family of this order is the *Compositae,* the most highly developed of all the dicotyledonous plant families, including such forms as the Daisy, Burdock, Dandelion, and their relatives and, among cultivated plants, the numerous horticultural varieties of Chrysanthemum, Hardy Aster, Dahlias, and others.

There are only a few woody genera of Composites with species hardy in this climate. A woody Chrysanthemum (*C. nipponicum*) may be seen in the Rock Garden. *Artemisia austriaca* and *A. procera,* and the Groundsel Tree (*Baccharis halimifolia*) form hedges at the north edge of the Compositae area.

The Dicotyledons terminate opposite the Rock Garden, and are separated from the Monocotyledons (on the north) by an area reserved for special plantings.

Monocotyledons

All of the plants having embryos with one seed-leaf (Monocotyledons), and with petals (when present) in 3's, are north of the Rock Garden and west of the Brook. They comprise the Lily, Iris, Canna, Grass, Orchid, and other Families.

Note that there are no monocotyledons trees hardy in this climate, and only a few shrubs, such, for example, as *Smilax rotundifolia,* which forms a clipped hedge along a portion of the north boundary of this group.

The hedges of ornamental grasses at the south end of the Monocotyledons include Blue Fescue (*Festuca ovina glauca*), Narrow-Leaved Eulalia (*Miscanthus sinensis gracillimus*), Awnless Eulalia (*M. saccharifer*), and Banded Eulalia (*M. sinensis zebrinus*). The hedge on the east side of the paved walk partly surrounds a collection of grasses of economic and horticultural interest.

The Bamboos are represented in the collection by *Arundinaria japonica* (also known as *Sasa japonica,* and formerly as *Bambusa metake,* and by other names). Also by *Sasa chrysantha, Sasa pygmaea,* and *Arundinaria fastuosa,* all four of which are fairly hardy in this climate.[1]

The Iris—Bearded, Siberian, and Southern United States species—are in beds north of the *Cannas.* The *Japanese Iris* are along the entire length of the Brook and on the shore of the Lake, in the Japanese Garden.

In passing south, through the Systematic Section, one passes the following six features on the left:

Experimental Garden

At the left (east), as one passes down through the Garden from the Polygonales toward the Heaths (Ericales), is the *Experimental Garden,* located south of the Conservatories and devoted to work in Plant Pathology, Plant Breeding (Genetics), and other experimental work. This garden is not open to the public. It is enclosed by a fence covered with Japanese Honeysuckle, and between the paved walk and this fence is a border planting of horticultural varieties of Tulips. The plants in the border are changed from time to time.

FIG. 17. Jenkins Fountain, Conservatory Plaza, September. (7030)

Actinidia Pergola

On the west side of the walk, opposite the bulb border and extending across the walk at each end, is a structure of concrete and wood designed for species of the Asiatic vine, *Actinidia,* including the "Silver-vine" (*A. polygama*), and others.

Linden Triangle

Between the Experimental and Children's Gardens is the *Linden Triangle*, containing a specimen of the Silver Linden (*Tilia argentea*), planted on October 25, 1923, by Ellen Eddy Shaw, curator of elementary instruction.

Children's Garden and Building

South of the Linden Triangle is the *Children's Garden,* with the *Children's Building* near the north end. This Garden comprises individual garden plots sufficient for the accommodation of about 200 boys and girls. At the south end is the *Shakespeare Garden,* a gift, in 1925, from Mr. Henry C. Folger, the well known Brooklyn collector of Shakespeareana. Surrounding the Children's Building is a horticultural planting of herbaceous plants, trees, and shrubs, laid out as an adjunct to the educational work with children. Over the entrance to the Children's Building is a quotation from the poet Wordsworth:

He is happiest who hath power
To gather wisdom from a flower.

Elm Triangle

West of the service gate of the Children's Garden and south of Azalea Knoll is the *Elm Triangle* containing a specimen of the American Elm (*Ulmus americana*), presented and planted on Arbor Day, April 24, 1925, by the Girl Scouts of Flatbush.

South of the Elm Triangle, and just inside the Richard Young Gate, is a horticultural planting of conifers and broad-leaved evergreens (*Pieris, Azalea, Arctostaphylos,* Heather, Yucca, and others).

On the west side of the paved walk, opposite the area between the Compositae and the Monocotyledons, is

The Rock Garden

The Rock Garden was constructed in the spring of 1916 of glacial boulders uncovered in the course of grading operations on other parts of the grounds. These boulders were deposited by one of the continental ice sheets during the Ice Age and formed the *terminal moraine* known locally as "the backbone of Long Island." One would not select rocks of this nature for rock-garden construction if other kinds were available, because their rounded contours do not permit them to be built into picturesque effects; and their hard, impervious surfaces are far from ideal for the cultural requirements of most rock plants which revel in rocks of a rough porous nature. But they are the only rocks available locally and it was thought logical and appropriate to use them.

In its early stages the Rock Garden was often contemptuously referred to as a "rock pile" due to the temporary and unavoidable obtrusiveness of the boulders; but it did provide fairly satisfactory conditions for the growth of alpine and saxatile plants—which, after all, is its *raison d'être.* In the course of time a certain amount of weathering has taken place, and evergreens set out as small plants in 1916 have grown to such an extent that they now adequately serve the purpose for which they were planted—that of toning down and partially masking obtrusive rocks. There are about 500 species of plants in the Rock Garden.

Alpine plants in general are notoriously intractable in a climate like that of New York City, but the careless feet of visitors are perhaps equally responsible for the loss of many of our cherished alpines and rock plants. Even with all these handicaps we have had a fair measure of success, and such well-known alpines as Rock-Jasmine (*Androsace*); Lewisias (from the Rockies and the mountains of the Pacific states); *Dianthus alpinus; Asperula nitida;* Edelweiss; *Draba aizoides* and many others tolerate our rather adverse conditions.

Although it is gay in April with alpine crocuses, glory-of-the-snow, squills, and other dwarf bulbous plants, the Rock Garden is perhaps at its best throughout the month of May, for at that time, in addition to a lavish display of bloom, the foliage is more ample, and the Rock Garden seems better furnished than early in the year when growth is just beginning.

FIG. 18. Vitis and Willows, facing west. June 25. (8883)

The Rock Garden is fully described in Guide No. 5, *The Rock Garden of the Brooklyn Botanic Garden.*

The Merchild

Opposite the Rock Garden the Brook widens into a fresh-water Swamp.

The *Bronze Statue,* Merchild, on the boulder just below the outlet of the Swamp, is the work of Isabel M. Kimball, of Brooklyn, and was presented to the Botanic Garden in 1928 by the late Mr. R. R. Bowker, a member of the Board of Trustees.

The Monocotyledons

If the visitor has not already done so, he may now pass north to that part of the General Systematic Section that contains the Monocotyledons, described on page 196.

The Return Journey

From the Monocotyledons one may now proceed northward past the Rose Arc and the Rose Garden to the Eastern Parkway Gate (*Gate No. 1*), or the north Flatbush Ave. Gate (*Gate No. 6*).

Conservatories

If one has time for more than the tour of the grounds, he may find the Conservatories of interest. They are located on the eastern (Washington Ave.) side of the Garden, and are open free to the public daily from 10 a.m. to 4 p.m.; on Sundays from 2 p.m. to 4 p.m. In summer they are open until 4:30 p.m. The hours of closing are fixed so as to give the gardeners time to wet down the plants before they leave for the day.

There are ten houses open to the public, containing a collection of tender and tropical plants. The large central house (No. 5) is devoted to plants of economic importance, and of interest to classes in nature study, geography, and botany, as well as to the general public, including the following:

Palms: Date palm, coconut palm, sago palm, oil palm.
Citrus Fruits: Grapefruit, orange, lemon, lime, kumquat.

Other Food Plants: Rice, sugarcane, banana, fig, pineapple, olive, pomegrante, arrowroot, tamarind, mango, avocado, durian, soursop.
Beverage Plants: Coffee, tea, chocolate tree, maté.
Condiments: Vanilla, pepper, ginger, cinnamon, cardamon.
Medicinal Plants: Quinine, cocaine, logwood, camphor.
Fiber Plants: Cotton, sisal, pandanus, manila hemp, jute.
Woods: Bamboo, mahogany, balsa.
Rubber: Para rubber, Nicaragua rubber, gutta-percha.

Library

The reference library, containing at present (1940) about 21,000 volumes and 18,000 bound pamphlets, and having on file the current numbers of over 1000 periodicals on plant life, gardening, and closely related subjects, is in the Laboratory Building, and is open free to the public daily, except Sunday, from 9 a.m. to 5 p.m. (Saturdays, 9 a.m. to 12 m.).

Bureau of Information

Inquiries concerning *Membership* in the Botanic Garden, or concerning any aspect of plant life and gardening, or the classes, lectures, and other activities of the Botanic Garden may be made at the Information Booth on the first floor of the Laboratory Building, or by writing or telephoning (*Telephone: Main 2-4433*).

Souvenir Postcards and Publications

Postcard views of the Botanic Garden and of interesting plants, popular *Leaflets,* and such *Guide Books* as have been published may be purchased for nominal sums at the Information Booth in the Laboratory Building.

Guides

1. The Brooklyn Botanic Garden. By C. Stuart Gager. 8 pages, 8 illustrations .....Out of print.
2. Gardens within a Garden: A general guide to the grounds of the Brooklyn Botanic Garden. 36 pages, 16 illustrations, folded map (1929) .....Out of print.

FIG. 19. Children's Garden. June 1. (5107)

3. The Story of Our Metate: A chronicle of corn. By Dr. F. W. Hodge, Curator, Museum of the American Indian. 25 pages, 14 illustrations .....25 cents.

4. The Japanese Garden. By Bunkio Matsuki. 38 pages, 20 illustrations .....Out of print.

5. The Rock Garden of the Brooklyn Botanic Garden. By Montague Free. 55 pages, 28 illustrations .....35 cents.

6. Japanese Potted Trees (Hachinoki). By Bunkio Matsuki. 11 pages, 11 illustrations .....40 cents.

7. The Story of Our Boulders (Glacial Geology). 43 pages, 22 illustrations. By C. Stuart Gager and Ernst Antevs. ..40 cents.

8. The Story of Fossil Plants. By Prof. E. W. Berry, Johns Hopkins University. 29 pages, 8 illustrations .....40 cents.

9. The Rose Garden of the Brooklyn Botanic Garden. By Montague Free. 57 pages, 12 illustrations, folded map ..50 cents.

Suggestions Welcomed

The management of the Brooklyn Botanic Garden will be glad to receive any suggestions or constructive criticisms as to how the collections or grounds may be made more attractive or educationally more effective. Suggestions should be addressed to the director.

Approximate Dates of Flowering at the Brooklyn Botanic Garden

To assist those who may visit the Garden from time to time, the following list has been prepared, giving the dates when some of the floral displays are at their best.

January to December

Conservatory plants.

January to early March

Chinese Witch Hazel (*Hamamelis mollis*)

Japanese Witch Hazel (*H. japonica*)

Vernal Witch Hazel (*H. vernalis*)

FIG. 20. Rock Garden, facing northwest. Flagstone trail interplanted with *Mazus reptans*. (2585)

MARCH

Snowdrops (about March 1)
Spring Crocuses (15–30)
Winter Aconite (15–30)
Amur Adonis (15–30)

APRIL 1

Cornelian Cherry
Coltsfoot
Squills
Bulbocodium
Japanese Andromeda
Iris reticulata

APRIL 8

Magnolia stellata

APRIL 15

Daffodils
Magnolia soulangeana, and other magnolias
Dwarf Blue Hyacinth
White Rock Cress
Evergreen Candytuft
Bleeding Heart
Globe Flower
Forsythia

MAY 1–30

The Rock Garden is at its best

MAY 1

Japanese Cherries
Hinodogiri and other Japanese Azaleas
Korean Azalea
Flowering Crab
Flowering Peach
Poet's Narcissus

MAY 1–21

Tulips

MAY 15–31

Native Wild Flower Garden
Ghent Azaleas
Lilacs

MAY 24
Bearded Iris
JUNE 1–15
Rhododendrons
Peony
JUNE 10
Mountain Laurel
Sheep Laurel
JUNE 10 to SEPTEMBER 30
Hardy Waterlilies
JUNE 10 to OCTOBER 31
Rose Garden and Rose Arc
JUNE 15 to JULY 10
Japanese Iris
JULY 1 to OCTOBER 15
Tropical Waterlilies
AUGUST 1 to SEPTEMBER 1
East Indian Lotus (*Nelumbo speciosa*) in the Lake
AUGUST 1 to SEPTEMBER 15
Gladiolus
AUGUST to OCTOBER 15
Cannas
SEPTEMBER to NOVEMBER
Native Witch Hazel (*Hamamelis virginiana*)
OCTOBER 1–15
Early Chrysanthemums
Michaelmas Daisies (Hardy Asters)
OCTOBER 15 to NOVEMBER 15
Chrysanthemums
DECEMBER 15–30
Christmas Rose (*Helleborus niger*), in Rock Garden

FIG. 21. Grass Hedges. September 17. On the left the species (from left to right) are: Blue Fescue (*Festuca ovina glauca*), narrow leaved Eulalia (*Miscanthus sinensis gracillimus*), and Awnless Eulalia (*M. saccharifer*); on the right the tall grasses are the banded Eulalia (*M. sinensis zebrina*). A portion of the systematic exhibit of Gramineae is shown at the extreme left. (5618)

THE BOTANIC GARDEN AND THE CITY

THE BROOKLYN BOTANIC GARDEN, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (total cost, about $300,000), and other permanent improvements to a total of more than $281,000, has been met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms of the annual Tax Budget appropriation.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden, from its beginning, to purchase all books for the library, all specimens for the herbarium, all lantern slides and photographic material, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all purposes are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual, by annual payment of	$ 10
2.	Sustaining, by annual payment of	25
3.	Contributing, by annual payment of ..	100
4.	Life, by one payment of	500
5.	Permanent, by one payment of	2,500
6.	Donor, by one payment of	10,000
7.	Patron, by one payment of	25,000
8.	Benefactor, by one payment of	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to eight carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Main 2-4433.

NOTE: *Contributions to the Brooklyn Botanic Garden, through membership dues or otherwise, constitute proper deductions under the Federal Income Tax Law.*

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden.

OUT-OF-TOWN MEMBERSHIP PRIVILEGES

In accordance with a cooperative arrangement with a number of other institutions and organizations, Brooklyn Botanic Garden members, when visiting other cities, may, on presentation of their Botanic Garden membership card at the office of the cooperating museum or organization, be accorded, without charge, the same privileges as are enjoyed by the members of that institution, including admission to exhibits and lectures, and invitation to social events. This does not include being enrolled on the mailing list for publications, and does not include free admission to the Philadelphia and Boston spring Flower Shows.

In reciprocation, the members of the cooperating units, when visiting the Metropolitan district of Greater New York, will be accorded full membership privileges at the Brooklyn Botanic Garden.

The cooperating units are as follows:

Academy of Natural Sciences, Philadelphia, Pa.
Berkshire Museum, Springfield, Mass.
Boston Society of Natural History, Boston, Mass.
Buffalo Museum of Science, Buffalo, N. Y.
California Academy of Sciences, San Francisco.
Carnegie Museum, Pittsburgh, Pa.
Charleston Museum, Charleston, S. C.
Cranbrook Institute of Science, Bloomfield Hills, Mich.
Everhart Museum of Natural History, Science and Art, Scranton, Pa.
Fairbanks Museum of Natural Science, St. Johnsbury, Vt.
Field Museum of Natural History, Chicago, Ill.
Los Angeles Museum, Los Angeles, Calif.
Massachusetts Horticultural Society, Boston, Mass.
Missouri Botanical Garden, St. Louis, Mo.
Newark Museum, Newark, N. J.
New York State Museum, Albany, N. Y.
Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
Pennsylvania Horticultural Society, Philadelphia, Pa.
Philadelphia Commercial Museum, Philadelphia, Pa.
Southwest Museum, Los Angeles, California.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

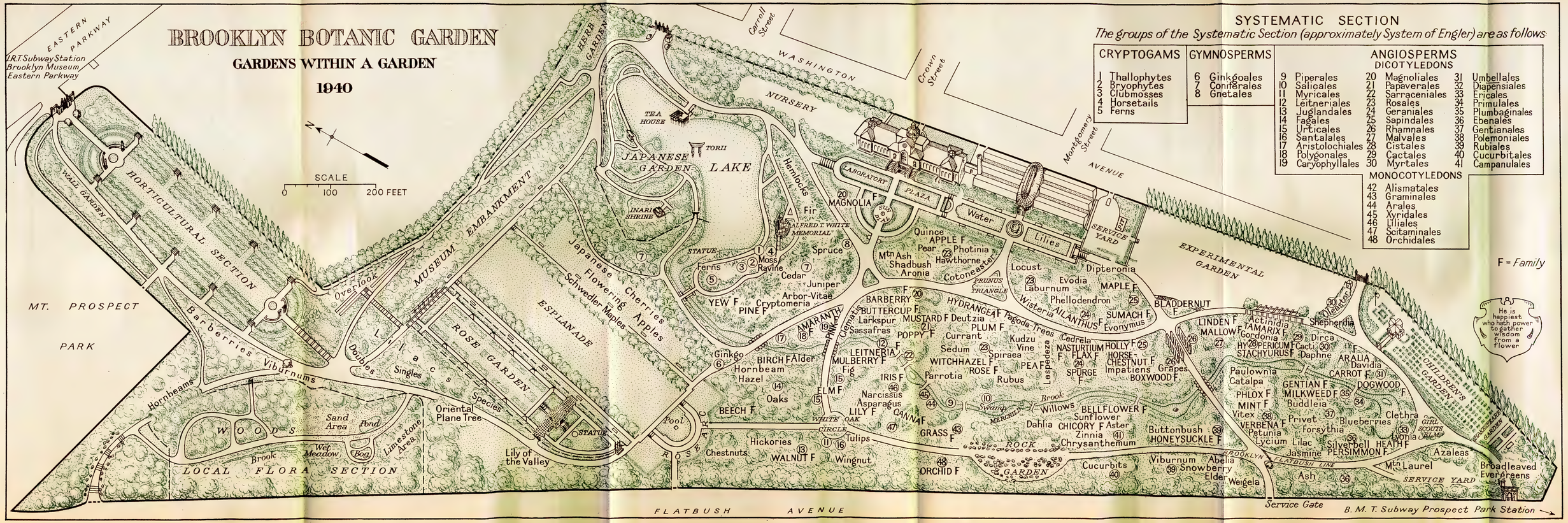
I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

.....

.....

* The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.



SYSTEMATIC SECTION

The groups of the Systematic Section (approximately System of Engler) are as follows:

CRYPTOGAMS	GYMNOSPERMS
1 Thallophytes	6 Ginkgoales
2 Bryophytes	7 Coniferales
3 Clubmosses	8 Gnetales
4 Horsetails	
5 Ferns	

ANGIOSPERMS

DICOTYLEDONS

9	Piperales	20	Magnoliales	31	Umbellales
10	Salicales	21	Papaverales	32	Diapensiales
11	Myricales	22	Sarraceniales	33	Ericales
12	Leitneriales	23	Rosales	34	Primulales
13	Juglandales	24	Geraniales	35	Plumbaginales
14	Fagales	25	Sapindales	36	Ebenales
15	Urticales	26	Rhamnales	37	Gentianales
16	Santalales	27	Malvales	38	Polemoniales
17	Aristolochiales	28	Cistales	39	Rubiales
18	Polygonales	29	Cactales	40	Cucurbitales
19	Caryophyllales	30	Myrtales	41	Campanulales

MONOCOTYLEDONS

42	Alismatales
43	Graminales
44	Arales
45	Xyridales
46	Liliales
47	Scitaminales
48	Orchidales

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Contributing Membership, $100 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9–6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Flatbush Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or McDonald-Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue, then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Free to members of the Garden. To others $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Paper:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 paper on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 87. Flower buds and phylogeny of Dicotyledons. 9 pages. 1939.

No. 88. The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 37. The Cyperaceae. 7 pages. 1939.

No. 89. Plants of Southern United States: I. Viburnum dentatum L. II. Satureja glabella (Michx.) Briquet. III. Woody Species of Hypericum. 19 pages. 1940.

No. 90. Physiologic Races of Oat Smuts. 9 pages. 1940.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. Price, 50 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.

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The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Flatbush Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or McDonald-Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue, then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Free to members of the Garden. To others $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Paper:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 paper on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 87. Flower buds and phylogeny of Dicotyledons. 9 pages. 1939.

No. 88. The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 37. The Cyperaceae. 7 pages. 1939.

No. 89. Plants of Southern United States: I. Viburnum dentatum L. II. Satureja glabella (Michx.) Briquet. III. Woody Species of Hypericum. 19 pages. 1940.

No. 90. Physiologic Races of Oat Smuts. 9 pages. 1940.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 6. Japanese potted trees (*Hachinoki*). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. Price, 50 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXIX OCTOBER, 1940 NO. 4

PROSPECTUS

OF COURSES, LECTURES, AND OTHER EDUCATIONAL ADVANTAGES OFFERED TO MEMBERS AND TO THE GENERAL PUBLIC

1940-1941

PUBLISHED QUARTERLY
BY THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
BROOKLYN, N. Y.

BROOKLYN BOTANIC GARDEN

Scientific, Educational, and Administrative Officers

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INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual, by annual payment of	$ 10
2.	Sustaining, by annual payment of	25
3.	Contributing, by annual payment of ..	100
4.	Life, by one payment of	500
5.	Permanent, by one payment of	2,500
6.	Donor, by one payment of	10,000
7.	Patron, by one payment of	25,000
8.	Benefactor, by one payment of	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to eight carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through cooperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Main 2-4433.

NOTE: *Contributions to the Brooklyn Botanic Garden, through membership dues or otherwise, constitute proper deductions under the Federal Income Tax Law.*

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and one guest to field trips and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days," and to the Annual Spring Inspection.
7. Copies of Garden publications, as follows:
   a. RECORD (including the ANNUAL REPORT).
   b. GUIDES (to the Plantations and Collections).
   c. LEAFLETS (of popular information).
   d. CONTRIBUTIONS (on request. Technical papers).
8. Announcement Cards (Post Card Bulletins) concerning plants in flower and other items of interest.
9. Privileges of the Library and of the Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out; on planting the home grounds; the care of lawns; and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.
13. Membership privileges in other botanic gardens and museums outside of Greater New York, when visiting other cities, and on presentation of membership card in Brooklyn Botanic Garden.

OUT-OF-TOWN MEMBERSHIP PRIVILEGES

In accordance with a cooperative arrangement with a number of other institutions and organizations, Brooklyn Botanic Garden members, when visiting other cities, may, on presentation of their Botanic Garden membership card at the office of the cooperating museum or organization, be accorded, without charge, the same privileges as are enjoyed by the members of that institution, including admission to exhibits and lectures, and invitation to social events. This does not include being enrolled on the mailing list for publications, and does not include free admission to the Philadelphia and Boston spring Flower Shows.

In reciprocation, the members of the cooperating units, when visiting the Metropolitan district of Greater New York, will be accorded full membership privileges at the Brooklyn Botanic Garden.

The cooperating units are as follows:

Academy of Natural Sciences, Philadelphia, Pa.
Berkshire Museum, Springfield, Mass.
Boston Society of Natural History, Boston, Mass.
Buffalo Museum of Science, Buffalo, N. Y.
California Academy of Sciences, San Francisco.
Carnegie Museum, Pittsburgh, Pa.
Charleston Museum, Charleston, S. C.
Cranbrook Institute of Science, Bloomfield Hills, Mich.
Everhart Museum of Natural History, Science and Art, Scranton, Pa.
Fairbanks Museum of Natural Science, St. Johnsbury, Vt.
Field Museum of Natural History, Chicago, Ill.
Los Angeles Museum, Los Angeles, Calif.
Massachusetts Horticultural Society, Boston, Mass.
Missouri Botanical Garden, St. Louis, Mo.
Newark Museum, Newark, N. J.
New York State Museum, Albany, N. Y.
Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.
Pennsylvania Horticultural Society, Philadelphia, Pa.
Philadelphia Commercial Museum, Philadelphia, Pa.
Southwest Museum, Los Angeles, California.

REGULATIONS CONCERNING PHOTOGRAPHING, PAINTING, AND SKETCHING

1. No permit is required for photographing with a hand camera, or for sketching or painting without an easel on the Grounds or in the Conservatories.

2. Sketching and painting with an easel and the use of a camera with tripod are not allowed in the Japanese Garden, the Rose Garden, the Local Flora Section (Native Wild Flower Garden), nor the Conservatories at any time without a permit. No permits are given for use after 12 o'clock noon on Sundays and holidays.

3. Artists, and the public in general, may not bring into the Botanic Garden chairs, stools, or anything to sit in or on.

4. Holders of permits must not set up tripod cameras nor easels in such a way as to involve injury to living plants or lawns, nor to cause an obstruction to traffic on congested paths or walks.

5. Application for permits should be made at the office of the Director, Laboratory Building, Room 301, or by mail (1000 Washington Avenue), or by telephone (MAin 2–4433).

BROOKLYN BOTANIC GARDEN RECORD

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PROSPECTUS: 1940–1941

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COURSES OF INSTRUCTION

The Brooklyn Botanic Garden offers courses of instruction in botany, gardening, horticulture, and nature study, and also opportunity for research; as follows:

A. For members and the general public ("A" courses, p. 217)
B. For teachers ("B" courses, p. 221)
C. For children ("C" courses, p. 223)
D. Courses for special groups ("D" courses, p. 224)
E. Investigation (p. 225)

Any course may be withdrawn when less than ten persons apply for registration and no course will be given for less than six persons. Since registration in many of the courses is restricted to a fixed number on account of the limited space available in the greenhouses, and for other reasons, those desiring to attend are urged to send in their applications for enrollment, with entrance fees, to the Secretary, Brooklyn Botanic Garden, several days in advance of the first exercise. This avoids delay at the beginning of the first exercise, ensures a place in the course, and enables the instructor to provide adequate material for the class.

Enrollment.—Persons are requested not to register in any course unless they are reasonably confident that they can attend the sessions of the class regularly and throughout. This is especially important where the number to be enrolled is limited. To register and not attend may deprive someone else of the privilege of attending. No registrations will be accepted for separate class exercises.

Equipment available for the courses:

Three *classrooms,* two *laboratory rooms,* and three *Instructional Greenhouses;* the *Children's Garden,* occupying about ¾ of an acre and divided into 150 plots for instruction in gardening; at the north end of the Children's Garden, the *Children's Building,* for conferences, and for the storage of tools, seeds, special collections, etc.; the *Auditorium,* on the ground floor, capable of seating 570 persons, and equipped with a motion-picture machine and stereopticon, and electric current, gas, and running water for experiments connected with lectures.

In addition to these accommodations, the dried plant specimens in the herbarium, the living plants in the conservatories and plantations, and the various types of gardens, are readily accessible. The main library and children's library, which contain a comprehensive collection of publications on every phase of gardening and plant life, may be consulted freely at any time.

A. Courses for Members and the General Public

Although the following courses are designed especially for Members of the Botanic Garden, they are open (unless otherwise specified) to any one who has a general interest in plants. Teachers are welcome. Starred courses (*) are open also for credit to students of Long Island University, and are described in the current Long Island University catalog. In harmony with an agreement entered into in the spring of 1935, the Botanic Garden, upon recommendation of the Chairman of the Biology Department of Long Island University, offers a course scholarship to one student of the University.

Unless otherwise specified, all "A" courses are *free to members,*† but the individual class exercises are open only to those who register for the entire course. Of others a fee is required, as indicated. In courses where plants are raised or collected, these become the property of the class members.

Fall Courses

A1. Plants in the Home: How to Grow Them.—Five talks with demonstrations. This course deals with the principles to be followed in raising plants, and in maintaining them in a healthy, vigorous condition in the home. Practice in potting, mixing soils, making cuttings, etc. The members of the class have the privilege of keeping the plants they have raised. *On account of restricted space in the greenhouse, this class must be limited to 40 persons. Registration according to the order of application. Fee to non-members, $6 (including laboratory fee); to members, $1 laboratory fee. Wednesdays, 11 a.m., November 6 to December 4.*

Mr. Free.

† For information concerning membership in the Brooklyn Botanic Garden consult pages i–iii.

***A5. Trees and Shrubs in Winter.**—Ten outdoor lessons, in the parks and woodlands of Greater New York, on the characteristics of our common trees and shrubs, both native and cultivated, emphasizing their distinguishing features in the winter condition. The habits, requirements as to soil, etc., and the use of various species in landscape art are also discussed. *Fee to non-members, $5. Saturdays, 2:30 p.m., October 5 to December 14 (omitting October 12).* The first session will be held at the Brooklyn Botanic Garden. Dr. Graves.

A10. Evergreens: How to Know Them and How to Grow Them.—Ten outdoor meetings for a study of the Garden collection of conifers and other evergreens, their characteristics, uses and cultivation. 1 & 2—Conifers of Northeastern America. 3—Southeastern North America. 4—Western North America. 5—Eastern Asia. 6—Northern and Western Asia. 7—Europe and North Africa. 8—Broad leaved Evergreens. 9—The Cultivation of Evergreens. 10—Review. Class members are given small specimens for identification, and seeds of some species. *Fee to non-members, $5. Tuesdays, 10:30 a.m. to 12 noon, September 17 to November 19.* Dr. Gundersen and Mr. Doney.

A13. Wild Flowers and Ferns of the New York Region.—Five field trips. How to know the common plants of woods and roadsides, including identification of wild fruits. *Fee to non-members, $2.50. Saturdays, 2:30 p.m., September 21 to October 26 (omitting October 12).* First meeting at the Botanic Garden. Miss Rusk.

***A31. Ornamental Shrubs.**—Eight sessions, held outdoors in the Botanic Garden, to study the common species and varieties of cultivated shrubs, emphasizing those desirable for planting on the home grounds. Fall flowers and fruits of ornamental shrubs and small trees, also evergreen shrubs, are considered. This is a continuation of the spring course A30. *Fee to non-members, $4. Wednesdays, 11 a.m., September 18 to November 6.* Mr. Doney.

A44. Walks and Talks in the Botanic Garden.—A course designed especially for Members of the Garden and their friends, to enable them to become acquainted with the general plan of the

Garden and the nature of the various special gardens, as well as other features of general interest. *No fee. Tuesdays, 4 p.m., October 1 and 15, 1940, and April 8, 22, May 20, and June 3, 1941.* Dr. Graves.

A45. Herbaceous Plants: Fall Course. Five outdoor meetings, for the study of fall-flowering herbaceous plants. This is a continuation of Course A39, giving special attention to plants of the Composite Family. One lesson will be given on vegetative propagation, with material for class members; some seeds will also be available. *Fee to non-members, $2.50. Wednesdays, 4 to 5:15 p.m., September 25 to October 23.*

Dr. Gundersen and Mr. Free.

Winter Course

A22. Trips to the Tropics.—Six guided tours through the Conservatories of the Botanic Garden, with informal, non-technical talks on interesting plants.

1 and 2. Foods from far-off lands.
3. Desert gardens.
4. Air plants and water plants.
5 and 6. Plants of prey.

No fee. Saturdays, 2 p.m., January 11, 18, 25, February 1, 8, 15. Class limited to twenty. Dr. Graves and Miss Rusk.

Spring Courses

***A9. Trees and Shrubs in Spring and Summer.**—Ten outdoor lessons in the parks and woodlands of Greater New York. Similar to A5, except that the different species are studied in their spring and summer conditions. *Fee to non-members, $5. Saturdays, 2:30 p.m., April 12 to June 14.* Dr. Graves.

A11. Wild Flowers and Ferns of the New York Region.—Seven sessions, in the Brooklyn Botanic Garden and in the woodlands near the City, for field identification of flowers and ferns of spring and early summer. *Fee to non-members, $3.50. Saturdays, 2:30 p.m., April 26 to June 14 (omitting May 31).* First meeting at the Botanic Garden. Miss Rusk.

A25. Fundamentals of Gardening.—Five lessons—greenhouse and lecture periods—and one outdoor demonstration, as follows: making cuttings of herbaceous perennials; sowing seed, and pricking out seedlings. Class limited to 45 persons. *Fee to non-members, $8.00 (including laboratory fee); to members, $3.00 laboratory fee. Wednesdays, 10:30 a.m., February 19 to March 26 (omitting March 19).* Date of outdoor lesson, tentatively April 30. Miss Shaw and Miss Dorward.

A26. Spring Garden Work.—Six lecture and practical work periods limited to those who have taken A25. Besides starting the newer annuals and perennials from seed, lectures on the herbaceous border, trees and shrubs, and the lawn will be given. "Color in the Garden" will be the subject of a lecture given by Miss Michalena L. Carroll. Class limited to 45 persons. *Fee to non-members, $7 (including laboratory fee); to members, $2 laboratory fee. Tuesdays, 10:30 a.m., February 25 to April 8 (omitting March 18).* Miss Dorward.

***A30. Ornamental Shrubs (Spring Course).**—Ten outdoor meetings on the grounds of the Botanic Garden. The principal flowering shrubs and small trees are considered at their times of flowering, emphasis being placed on their uses in landscape work, their cultivation, and distinguishing characters. *Fee to non-members, $5. Wednesdays, 11 a.m., April 9 to June 11.* Mr. Doney.

A32. Families of Flowering Plants.—Ten outdoor meetings in the Garden. Flower structures and other characteristics are observed with a hand lens, emphasizing family resemblances and differences rather than those of species. *Fee to non-members, $5. Wednesdays, 10:45 a.m., April 9 to June 11.* Dr. Gundersen.

A37. Lilacs in Flower.—Five outdoor lessons. The comprehensive collection of the Garden affords opportunity for the study of about twenty species and a large number of the finest varieties of lilacs. In the last lessons, culture and propagation are taken up; cuttings, which become the property of those taking the course, are prepared for rooting. *Fee to non-members, $2.50. Four Mondays and one Thursday, 4 to 5:15 p.m., May 5, 12, 15, 19, and June 9.* Dr. Gundersen and Mr. Free.

A39. Herbaceous Plants (Spring Course).—(Not offered in 1941.)

A46. Conifers Around the World.—Three lectures illustrated with specimens and lantern slides. 1—American conifers. 2—European and African conifers. 3—Asiatic and Australian conifers. *No fee. Wednesdays, 11 a.m., March 12, 19, and 26.* Dr. Gundersen.

B. Courses for Teachers

These courses have been accepted by the Board of Education of New York City for "in-service credit," one credit being granted for each 15 hours (with the exception of "B8, Plant Culture"). Through an agreement with Long Island University, undergraduate credit for certain courses will be allowed toward fulfilling the requirements for a university degree, provided the admission requirements at the University and the laboratory requirements at the Botanic Garden have been fulfilled. Such courses are starred (*). By special arrangement with the institution concerned, these credits have also been used as undergraduate credits in other colleges and universities. Nature materials used in the courses, and plants raised, become the property of the student.

Members of the Garden are entitled to a 50 per cent. discount from the regular fee for all "B" courses; of other persons the indicated fee is required. Long Island University students desirous of electing any of these or of the "A" courses should notify Dean Tristram W. Metcalfe or Dr. Ralph H. Cheney, who will give the candidate a card entitling him to admission to the course. The student should present this card at the beginning of the first session of the course.

B1. General Botany.—(Not offered in 1940–41.)

B2. Nature Study.—(Not offered in 1940–41.)

B3. Elements of Horticulture.—Thirty sessions. For teachers only. Lessons in potting and general care of house plants; methods of plant propagation, including the planting of bulbs; making cuttings (soft wood, and leaf); sowing seeds; preparing for the outdoor garden. Most of this work is carried on in the

greenhouses. All plants raised become the property of the student. Two credits. (No credit allowed for a half-year of work.) *Fee, $10. Wednesdays, 4 p.m., beginning September 25.*

Miss Shaw and Miss Dorward.

B5. Garden Practice.—(Not offered in 1940–41.)

B7. Greenhouse Work.—Thirty sessions. For teachers only. Open to students who have completed Elements of Horticulture (B3). Further study of plant propagation; culture of a great variety of house plants and spring-flowering greenhouse plants; arrangements in hanging baskets, dishes, and terraria. Two credits. *Fee, $10. Tuesdays, 4 p.m., beginning October 1.*

Miss Dorward.

B8. Plant Culture.—A course of twenty weeks' duration for those who have completed Elements of Horticulture (B3) and Greenhouse Work (B7). All work is done in the greenhouses. No Board of Education credits are given for this course. *Fee, $10. Thursdays, 4 p.m., beginning October 17.*

Miss Shaw and Miss Dorward.

***B10. Flowering Plants and Ferns: Field and Laboratory Study.**—Thirty sessions. The object of this course is to become acquainted with species of wild flowering plants, including weeds. Field and laboratory work are distributed according to the weather, the season, and the needs of the class. The field work is done at the Brooklyn Botanic Garden. The laboratory work consists of examining flowers and learning how to distinguish them; and of pressing and mounting plants to serve as permanent specimens. Four credits. *Fee, $10. Thursdays, 4–6 p.m., beginning September 26.*

Miss Rusk.

***B13–14. Trees and Shrubs of Greater New York.**—Twenty two-hour sessions. A course of outdoor lessons in the parks and woodlands of Greater New York, the principal object being to gain a ready acquaintance with the common trees and shrubs of the eastern United States, which are well represented in this region. The species are considered in systematic order, in both winter and summer conditions, and the features pointed out by

which they may most easily be recognized. Two credits. *Fee, $10. Saturdays, 2:30 p.m., October 5 to December 14 (omitting October 12); and April 12 to June 14, 1941.* Dr. Graves.

C. Children's Courses

More than thirty separate courses are given Saturday mornings for boys and girls from eight to nineteen years old in the spring, fall, and winter.

The children are grouped according to age and experience. For example, under I (below), twelve separate courses are given; under II, four separate courses; under III, fourteen. Under IV, the Outdoor Garden, 200 children are working from late April to mid-September. This does not represent one course, but many courses combined under one heading, "The Outdoor Garden."

Miss Shaw and Assistants.

I. The Fall Course takes up nature study on the grounds; plant propagation in the greenhouses, using stem and leaf cuttings; bulbs and corms; making of terrariums and dish gardens. Enrollment limited to 175 children. *Fee, fifteen cents. Saturday mornings, 9–11:15, October 19 to December 21.*

II. Winter Course.—Children who have shown unusual ability are chosen from the fall group for early winter work. Group limited to 50. *No fee. Saturday mornings, 9–11:15, January 18 to February 15.*

III. Spring Course.—Nature study and preparation for the outdoor garden, including studies of seed germination, seed sowing in the greenhouse, and the making of garden plans. All candidates for the outdoor garden must be in spring classes. Enrollment limited to 200. *Fee, fifteen cents. Saturday mornings, 9–11:15, March 1 to April 12.*

IV. Outdoor Garden Course.—The outdoor garden is open throughout the summer season, and time is arranged to fit in with children's vacation schedules. No child is assigned an outdoor garden who has not had the spring preparatory work. Group limited to 200 children. *Fee, twenty-five or thirty-five cents depending on the size of the garden.* The garden session begins *April 26.*

D. Courses for Special Groups

D1. General Botany with Special Reference to Medicinal Plants.—A course of 10 spring or 10 fall lectures, demonstrations, and field trips for student nurses. Arranged in cooperation with various hospitals. The general principles governing the life of plants, as well as the use and care of flowers and potted plants in the sick room, are considered. Special attention is paid to the outdoor identification of officinal plants. Hours to be arranged. *No fee.* Dr. Graves.

D2. Trees and Shrubs: Spring Course for Employees of the Park Department and Others.—Ten trips in the parks and woodlands of New York to become acquainted with the common kinds of woody plants, both native and cultivated. The habits, rate of growth, economic value, and importance in forestry, horticulture, and landscape art are discussed. *Fee to non-members, $5; free to members of the Garden. Thursdays, 2:30 p.m., April 17 to June 19.* First meeting at Brooklyn Botanic Garden. For park employees the necessary time for attending will be arranged.
Dr. Graves and Mr. Doney.

D3. Trees and Shrubs: Fall Course for Employees of the Park Department and Others.—Ten trips in parks and woodlands of New York to become acquainted with the common kinds of woody plants, both native and cultivated. The habits, rate of growth, economic value, and importance in forestry, horticulture, and landscape art are discussed. *Fee to non-members, $5; free to members of the Garden. Thursdays, 2:30 p.m., October 10 to December 19 (omitting Thanksgiving Day).* First meeting at Brooklyn Botanic Garden. For park employees the necessary time for attending will be arranged. Dr. Graves and Mr. Doney.

D4. Gardening: for Employees of the Park Department and Others.—Twelve periods. Soils and fertilizers; planting and transplanting (trees, shrubs, bulbs, perennials, etc.); lawn-making and maintenance; herbaceous perennials, including bulbs; annuals and biennials; rose growing; rock and water gardens; insect and fungous pests; pruning; plant propagation; principles of greenhouse management. *Fee to non-members, $6; free to members of*

the Garden. Wednesdays, 3:30 p.m., September 25 to December 18 (omitting the day before Thanksgiving Day). For park employees the necessary time for attending will be arranged.

Mr. Free.

E. Investigation

1. *Graduate Work for University Credit*

By the terms of a cooperative agreement between New York University and the Brooklyn Botanic Garden, properly qualified graduate students may arrange to carry on independent investigations in botany at the Garden under the direction of members of the Garden Staff, who are also officers of instruction in the Graduate School of the University. The advantages of the library, laboratories, herbarium, and collections of living plants at the Garden are freely at the disposal of students registered at New York University for such work. Such properly enrolled graduate students are charged no additional fees by the Garden.

The research courses in botany presuppose a knowledge of plants obtained from a study in field and laboratory. Prerequisites include college courses along such lines as morphology, physiology, taxonomy, and genetics. Bacteriology and mycology are special prerequisites for E6. For E8, plant pathology and basic training in forestry are also required.

E6. Research in Mycology and Plant Pathology. Dr. Reed.

E8. Research in Forest Pathology. Dr. Graves.

E9. Research in the Systematic Botany of the Flowering Plants. Dr. Svenson.

E10. Research in the Structure of Flowers. Dr. Gundersen.

2. *Independent Investigation*

The facilities of the laboratories, conservatories, library, and herbarium are available to qualified investigators who wish to carry on independent researches in their chosen field of botany. By "qualified investigators" is meant those who have obtained the doctor's degree or have completed most of the requirements for

the doctorate. The laboratories are open for such use only during the hours when the Laboratory Building is regularly open, viz. 9 a.m.–5 p.m. Mondays to Fridays; 9–12 a.m. Saturdays, except on holidays, when the building is closed. There is a charge of $25 per year, payable to the Botanic Garden.

COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York in all matters pertaining to the study of plants and closely related subjects. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration methods, study material, etc., which otherwise would not be available.

Geography classes, as well as classes in nature study and botany, find the collection of useful plants in the Economic Plant House, the Local Flora Section, the Japanese Garden, and also the Meridian Panel, the Armillary Sphere, and the Labeled Glacial Boulders, valuable adjuncts to their class work. Arrangements may be made by teachers of geography to have their classes study these features under guidance. Illustrated lectures at the Garden for geography classes may also be arranged.

To visiting college classes in geology and physiography the Botanic Garden offers interesting material for a study of glaciation. Notable features are a portion of the Harbor Hill terminal moraine (Boulder Hill), the morainal pond (the "Lake"), the labelled glacial boulders, and the Flatbush outwash plain. See Guide No. 7, *"The Story of our Boulders: Glacial Geology of the Brooklyn Botanic Garden."*

Talks at Elementary Schools.—The principals of public or private elementary schools may arrange to have talks given at the schools on various topics related to plant life, such as school gardens and garden work with children, tree planting, the conservation of wild flowers, Arbor Day, etc. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the

Curator of Elementary Instruction for a list of talks and for appointments.

Talks at Secondary Schools and Colleges.—Informal illustrated talks on various subjects of an advanced botanical nature are always gladly given at Secondary Schools and Colleges by members of the staff. Arrangements for such talks should be made with the *Curator of Public Instruction.*

School Classes at the Garden.—Public or private schools, both elementary and secondary, may arrange for classes to come to the Botanic Garden for illustrated lectures by a member of the Garden staff, or for guided tours of instruction through the conservatories and outdoor plantations. Such lectures, conservatory trips, and outdoor trips are planned for correlation with the New York City school syllabi in nature study, biology, and geography.

Visiting classes must be accompanied by their teachers, and notice of such visits should be sent at least one week in advance. Blank forms for this purpose are provided by the Garden. Lists of talks and trips offered will be sent on request: for Junior High and Elementary Schools address the *Curator of Elementary Instruction;* for High Schools, the *Curator of Public Instruction.*

The Garden equipment, including plant material, lecture rooms, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance, so that such work will not conflict with other classes and lectures. For High School and College classes address the *Curator of Public Instruction.* For Junior High and Elementary School classes address the *Curator of Elementary Instruction.*

The principal of any Elementary or High School in Brooklyn may arrange also for a series of six lessons on plant culture to be given to a class during the fall or spring. A small fee is charged to cover the cost of the materials used. The plants raised become the property of the pupils. The lessons are adapted for pupils above the third grade.

Seeds for School and Home Planting.—Penny packets of flower and vegetable seeds are put up by the Botanic Garden for

children's use. In the early spring, lists of these seeds, order blanks for teachers and pupils, and other information may be secured on application to the *Curator of Elementary Instruction.*

Demonstration Experiments.—Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden for the benefit of their classes. Communications in regard to these matters should be addressed to the *Curator of Public Instruction.*

Loan Sets of Lantern Slides.—Sets of lantern slides have been prepared for loan to the schools. Each set is accompanied by a short lecture text of explanatory nature. In all cases these sets must be called for by a responsible school messenger and returned promptly in good condition. Address, by mail or telephone, Mr. Frank Stoll, custodian. The subjects now available are as follows. Other sets are in preparation.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Summer Wild Flowers
5. Fall Wild Flowers
6. Forestry
7. Conservation of Native Plants

Study and Loan Material for Elementary Schools.—To the extent of its facilities, the Botanic Garden will provide, on request, various plants and materials for nature study. As far as possible this material will continue to be supplied gratis to elementary schools. Requests from Elementary Schools should be made to Miss Elsie T. Hammond, and material should be called for at the Information Booth on the ground floor.

Special Work for the Blind.—Short courses of two or three lessons will be given to blind children of elementary and junior high school age. The work will be both in the greenhouses and on the grounds, supplemented by special opportunities for handling living materials in order to acquaint the children with the world about them. This series will be given free of charge to classes of not more than 15 children and not less than 7. The work will be offered on schooldays to supplement and enrich regular classwork.

Study and Loan Material for Colleges, High Schools, and Junior High Schools

Available at the Brooklyn Botanic Garden, 1940–1941

The Botanic Garden is able to supply various plants and plant parts for study; certain protozoa; sterilized nutrient agar; and also material and mounts for exhibit purposes. When containers are necessary, as in the case of agar, algae, and protozoa, they must be furnished by the school.

In the past, the Garden has offered this service gratis, but both on account of the increasing demand and because of the decrease in appropriations, it has become necessary to make a small charge for the material supplied or loaned. A Price List of the various materials furnished will be mailed on request.

Requests should be made by mail or telephone (Main 2–4433), at least one day in advance, to Dr. Elizabeth Marcy, and the material should be called for at Room 204. All exhibit material will be mailed if the school pays postage.

LIVING MATERIAL—PLANTS

Algae: Fresh material: Desmids, Hydrodictyon, Oedogonium, Oscillatoria, Pleurococcus, Scenedesmus, Spirogyra, Vaucheria.

Preserved material: Spirogyra conjugating.

Bacteria: Cultures of *B. coli, B. subtilis, Pseudomonas radicicola, Sarcina flava.*

Fungi: Plus and minus strains of bread mold (*Rhizopus nigricans*). Spores or cultures.

Liverworts: Conocephalum, Lunularia, Marchantia.

Mosses: Protonema, Felt, Felt with capsules.

Ferns: Prothallia, Fronds with spores.

Gymnosperms: Cones, Twigs.

Angiosperms:

Plants: For photosynthesis experiments—Green geranium, Silver geranium, Tradescantia; *With fleshy leaves*—Bryophyllum, Sedum; *Water Plants*—Elodea, Duckweed; *Sensitive Plants—Mimosa pudica.*

Leaves: Sedum, Sansevieria, Coffee, Lilac, and others.
Stems: Twigs to show buds, leaf scars, etc.; Corn stems.
Seeds: For study of root hairs and germination—Castor bean, Garden bean, Lupine, Peas, Oats, Corn, Sorghum, Wheat.
Material illustrating methods of Plant Propagation:
Stem cuttings: (rooted or unrooted) Tradescantia, Begonia, Coleus, Geranium, English ivy, Willow; *Leaf cuttings:* (rooted or unrooted) Bryophyllum, Sansevieria, Kalanchoe; *Runners:* Strawberry, Saxifrage; *Offsets:* Sempervivum; *Grafts:* Geranium; *Corms:* Gladiolus.
Material for the study of Genetics:
Sorghum seeds for growing F_2 seedlings showing Mendelian ratios: Red and green seedling color (3:1); Normal and albino seedlings (3:1); Dihybrid ratio—red, green, normal, albino.
Pea seeds of tall and dwarf strains.
Seedlings of any of the above.
Drosophila—wild type, white, sepia, vestigial.

LIVING MATERIAL—ANIMALS

Protozoa: Cultures of Amoeba, Blepharisma, Paramecia, Euglena.
Drosophila: Wild type, white, sepia, vestigial.

STERILIZED AGAR

Petri dishes, test tubes, or flasks, sent in clean and dry, one week in advance, will be filled with sterile nutrient agar, or with potato dextrose agar for the study of bacteria and molds.

SPECIMENS AND MOUNTS FOR EXHIBIT

Mosses: Mounts covered with cellophane.
Life history of a moss plant—*Polytrichum commune.*
Fungi and plant diseases: Bracket fungi.
Leaves showing leaf spot diseases (rusts, mildews, and others).
Smut of oats, or wheat, or ergot of rye displayed in test tubes.
Angiosperms:
Riker mounts—Leaf modifications, Seed dispersal. Fruits of trees, flowering plants, weeds, lotus pods, etc.

Economic plants: Bundles of barley, oats, rice, rye, sorghum, wheat. Test tubes of grain threshed. Types of grains—Riker mount.

Illustrating the principles of genetics:

Pea seeds illustrating a dihybrid ratio (wrinkled, smooth, yellow, green)—Riker mounts or vials.

Jimson weed (Datura)—Mount to show F_2 segregation of spiny and smooth pods.

Corn showing monohybrid and dihybrid ratios:

Unmounted, in glass tubes, or in display cases.

Sorghum—Hybrid vigor—Riker mount.

Sorghum—Inheritance of seed color—Riker mount.

Oats—Inheritance of hull color—Riker mount.

Snapdragon—Inheritance of flower color—Riker mount.

LIBRARY

The rapidly growing library of the Garden comprises at present about 21,000 volumes and about 18,000 pamphlets. This is not a circulating library, but is open free for consultation to all persons daily (except Sundays and holidays) from 9 a.m. until 5 p.m. (Saturdays, 9 to 12). More than 1,000 periodicals and serial publications devoted to botany and closely related subjects are regularly received. These include the transactions of scientific societies from all quarters of the globe; the bulletins, monographs, reports, and other publications of various departments of the United States Government, as well as those of foreign governments, and of all state agricultural experiment stations and agricultural colleges; the publications of research laboratories, universities, botanic gardens, and other scientific institutions of the world, as well as the files of independent journals devoted to the various phases of plant life. The library is specially rich in publications of foreign countries and has a growing collection of incunabula and other pre-Linnaean works.

Bibliographical assistance is rendered to readers by members of the Library staff.

An annotated list of the incunabula, pre-Linnaean works, old herbals and other rare or historically important books in the Li-

brary was published as the July, 1935, number of the Botanic Garden RECORD. Copies are for sale at 40 cents each.

HERBARIA

The Phanerogamic Herbarium consists of more than 210,000 specimens of flowering plants, chiefly from North America. Among the important collections represented is the herbarium of A. A. Heller, containing many of his type specimens, chiefly from the western States and especially rich in *Lupinus*. There are also large collections from Suksdorf, Sandberg, Bolander, Hall and Harbour, Nevious, Howell, and others. From the eastern States are the large New Jersey collections of Henry Dautun and C. F. Austin, the herbarium of E. L. Morris, primarily from the District of Columbia, and the miscellaneous collections of Stephen Calverley. There is a large representation of the Long Island flora including the herbarium of E. S. Miller and selected specimens from William C. Ferguson. In addition, the herbarium contains several collections of very old specimens presumably from the Brooklyn Lyceum of Natural History, apparently the herbarium of William Cooper, and early collections of Torrey, Leavenworth, Croom, and Gates.

The Cryptogamic Herbarium contains a large collection of ferns, mosses, liverworts, lichens, and algae. It also contains the mycological collection consisting of approximately 79,000 specimens of fungi and myxomycetes, including the mycological collection of Dr. Franz Bubák, of Prague, for many years director of the Tabor Botanical Garden. This collection, of 33,779 specimens, includes type specimens of more than 500 species new to science, described by Dr. Bubák.

Other exsiccati represented in the Garden herbarium are those of E. Bartholomew; Ellis & Everhart; Jaczewski, Komarow and Tranzschel; W. A. Kellerman; Raciborski; Seymour & Earle; C. L. Shear; H. & P. Sydow; David Griffiths; and others.

These herbaria may be consulted daily (except Sundays and holidays) from 9 a.m. until 5 p.m.; Saturdays from 9 a.m. to 12 m. Specimens may be submitted for identification.

CONSERVATORIES

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography are the following useful plants from the tropics and subtropics:

Palms: Date palm, coconut palm, sago palm, oil palm.
Citrus Fruits: Grapefruit, orange, lemon, lime, kumquat.
Other Food Plants: Rice, sugarcane, banana, fig, pineapple, olive, pomegranate, arrowroot, tamarind, mango, avocado, durian, soursop.
Beverage Plants: Coffee, tea, chocolate tree, maté.
Condiments: Vanilla, pepper, ginger, cinnamon, cardamon.
Medicinal Plants: Quinine, cocaine, logwood, camphor, aloe.
Fiber Plants: Cotton, sisal, pandanus, manila hemp, jute.
Woods: Bamboo, mahogany, balsa.
Rubber: Para rubber, Nicaragua rubber, gutta-percha.

It may be of interest to teachers of botany that the nine extant genera of cycads are represented in House 12.

The Conservatories are open April 1 to October 31, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to March 31, 10 a.m.–4 p.m. (Sundays, 2–4).

BUREAU OF PUBLIC INFORMATION

Consultation and advice, and the facilities of the library and herbarium are freely at the service of members of the Botanic Garden and (to a limited extent) of others with special problems relating to plants or plant products, especially in the following subjects:

1. The care of trees, shrubs, and lawns, and general gardening problems.
2. The growing of cultivated plants and their arrangement; also their adaptation to soils, climate, and other factors.
3. Determination (naming) of flowering plants.
4. Plant diseases and determination of fungi.
5. Plant geography and ecology.

Inquiries should be directed to the *Curator of Public Instruction,* preferably by letter.

Determination of Specimens.—If the identification of plants is desired, the material submitted should include flowers, and fruit when obtainable. Identification of a single leaf is often impossible. For identification of plant diseases, representative portions of the part diseased should be sent.

DOCENTRY

To assist members and others in studying the collections, the services of a docent may be obtained. Arrangements should be made by application to the *Curator of Public Instruction* one week in advance. No parties of less than six adults will be conducted. This service is free of charge to members and accompanying friends; to others there is a charge of 50 cents per person. For information concerning membership in the Botanic Garden see pages i–iii of this PROSPECTUS.

EXTRA-MURAL LECTURES

With the exception of talks to schools, the Botanic Garden does not officially schedule members of its personnel for lectures or talks outside the Botanic Garden, except for lectures on the Garden itself or some aspect of its work. In such cases no fee is charged beyond traveling expenses.

Several members of the personnel are available for lectures to garden clubs and other organizations on topics of general horticultural or botanical interest. A list of lecturers, with lecture topics and the fee charged, may be had by addressing the *Curator of Public Instruction.* Arrangements are to be made directly with the lecturer concerned.

MEETINGS OF OUTSIDE ORGANIZATIONS

The Brooklyn Botanic Garden is glad to welcome outside organizations wishing to hold meetings at the Garden, provided the general purpose of the organization is closely allied to that of the Botanic Garden (e.g., Botanical Groups, Garden Clubs, Nature

Study Clubs, Conservation organizations, etc.), or that the specific purpose of the meeting is of mutual interest and advantage to the organization and the Botanic Garden. Meetings must always be arranged for in advance. A folder giving full details, and an application blank may be had by addressing *The Custodian*.

BROADCASTING

For the past ten years members of the Garden staff have given broadcasts from various stations, on subjects related to plant science. With a few exceptions these broadcasts have been made either independently, over WNYC, as a regular feature of the Garden's educational work, or they have been given over WOR, in cooperation with the *Radio Garden Club,* an organization connected with the Agricultural Extension Work of Rutgers University, New Brunswick, New Jersey.

Beginning in 1936, regular schedules of broadcasts have been issued twice yearly by the Garden, covering six-month periods; i.e., January to June, and July to December. The current schedule, listing forthcoming broadcasts over WNYC, and for the *Radio Garden Club,* over WOR, will be mailed on request.

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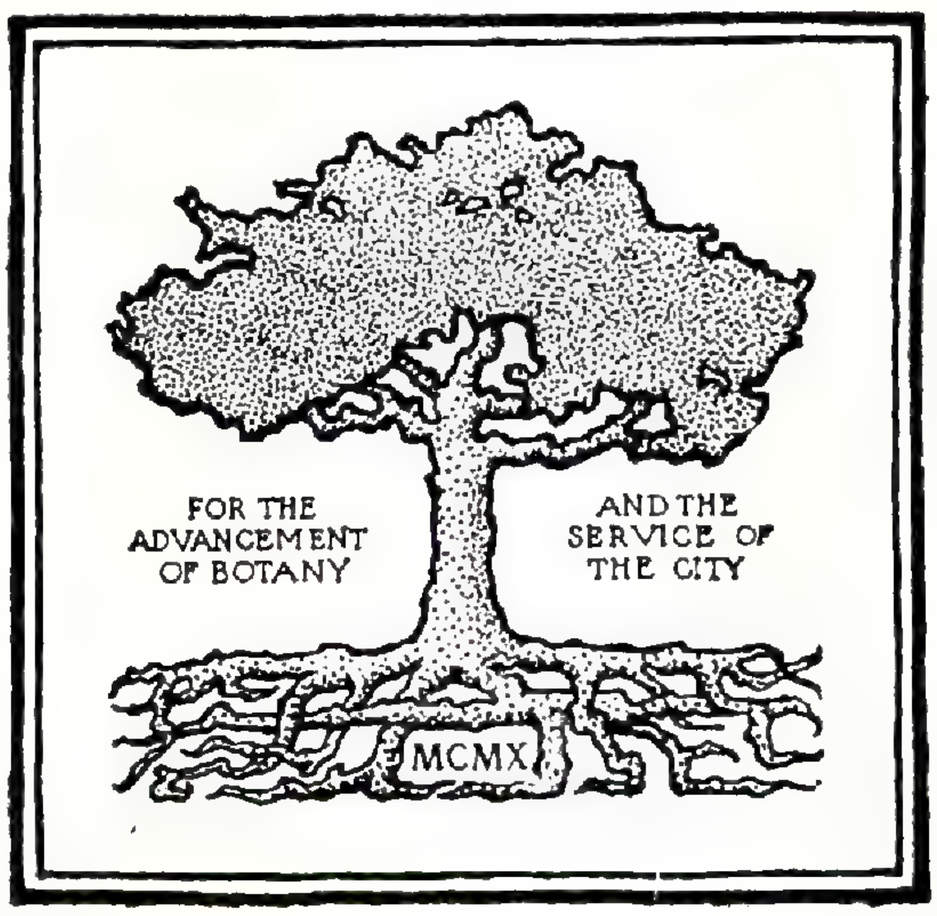
BROOKLYN BOTANIC GARDEN

RECORD

EDITED BY

C. STUART GAGER



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MEMBERSHIP.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Contributing Membership, $100 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Main 2–4433.

THE BOTANIC GARDEN is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

ENTRANCES.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Park; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

TO ASSIST MEMBERS and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

TO REACH THE GARDEN take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolley to Flatbush Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or McDonald-Vanderbilt Avenue trolley to Prospect Park Plaza and Union Street. BY AUTOMOBILE from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue, then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, educational *Prospectus, Seed List, Guides.* Free to members of the Garden. To others $1.00 a year. *Guide numbers specially priced.* Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Not offered in exchange. Circulates in 48 countries.

Volume I. *Dedication Paper:* 33 scientific papers presented at the dedication of the laboratory building. 1917. 521 pages. $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 1927. 151 pages. $1.60.

Volume IV. *Twenty-fifth Anniversary Papers.* 9 papers on 25 years of progress in botany (1910–1935); 5 papers on horticulture. 1936. 133 pages. $1.35.

CONTRIBUTIONS. Established, 1911. Papers originally published in periodicals, reissued as "separates" without change of paging. 25 numbers constitute one volume. 25 cents each, $5.00 a volume. Circulates in 34 countries.

No. 87. Flower buds and phylogeny of Dicotyledons. 9 pages. 1939.

No. 88. The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 37. The Cyperaceae. 7 pages. 1939.

No. 89. Plants of Southern United States: I. Viburnum dentatum L. II. Satureja glabella (Michx.) Briquet. III. Woody Species of Hypericum. 19 pages. 1940.

No. 90. Physiologic Races of Oat Smuts. 9 pages. 1940.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. Contain popular, elementary information about plant life for teachers and others; also announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries. Infrequent since 1936.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 8. The story of fossil plants. 8 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 9. The Rose Garden of the Brooklyn Botanic Garden. 12 illustrations, folded map. Price, 50 cents.

Guide No. 10. Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. Second Edition. 57 pages; 21 illustrations. Folded map. Price, 25 cents; by mail, 30 cents.

SEED LIST (*Delectus Seminum*). Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $5.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly, in coöperation with GENETICS, INCORPORATED. Subscription, $6.00 a year. Circulates in 37 countries.